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Selected Properties of Hydrogen

(Engineering Design Data)

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Selected Properties of Hydrogen (Engineering Design Data)

R. D. McCarty
J. Hord
H. M. Roder

Center for Chemical Engineering
National Engineering Laboratory
National Bureau of Standards
Boulder, CO 80303

Edited and compiled
by J. Hord

U.S. DEPARTMENT OF COMMERCE, Malcolm Baldrige, Secretary
NATIONAL BUREAU OF STANDARDS, Ernest Ambler, Director

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SELECTED PROPERTIES OF HYDROGEN
(Engineering Design Data)

R. D. McCarty, J. Hord, and H. M. Roder

ABSTRACT

The National Bureau of Standards has been engaged in the compilation, review, analytical and experimental derivation, and publication of hydrogen properties for over 20 years. The properties data presented herein are compiled largely from those accumulated data; of course, pertinent data and work of other researchers in the field are also included.

The general interests of scientists and engineers engaged in energy systems studies were given top priority in choosing the properties material presented in this book. Hydrogen systems cut across many energy related fields, e.g., nuclear fusion, magnetohydrodynamics, electrolysis and thermochemical decomposition of water, coal and shale derivative fuels, solar and wind power, ocean energy, geothermal processes, etc. It is generally conceded that hydrogen could be used to satisfy virtually all fuel requirements that are currently being met with natural gas and oil. To satisfy the demand for properties data over this broad spectrum of interests, we have attempted to provide comprehensive coverage of physical properties over a wide range of pressures and temperatures.

Thermophysical properties of liquid, liquid-vapor, vaporous, and gaseous hydrogen are presented in Chapter 1 and the solid-liquid, solid-vapor, and solid phase properties are compiled in Chapter 2. Ortho-para modifications of the hydrogen molecule and attendant property variations are considered in both chapters. Combustion and safety data, pertinent to hazard analysis of hydrogen systems, is collected in Chapter 3. Important miscellaneous properties are compiled in Chapter 4, data figures are compiled in Chapter 5, data tables are collected in Chapter 6, and Chapter 7 summarizes symbols, units, and conversion factors used throughout the book.

Key words: Hydrogen; hydrogen computer codes; hydrogen design data; hydrogen-gas; hydrogen graphs; hydrogen handbook; hydrogen-liquid; hydrogen properties; hydrogen safety; hydrogen-solid; hydrogen tables; hydrogen thermophysical properties.

PREFACE

The National Bureau of Standards (NBS) has been engaged in the compilation, review, analytical and experimental derivation, and publication of hydrogen properties for over 20 years. The properties data presented herein are compiled largely from those accumulated data; of course, pertinent data and work of other researchers in the field are also included. This compilation was completed in March 1978 and data preparation, editorial review, and final manuscript revisions were completed in October 1980.

The general interests of scientists and engineers engaged in energy systems studies were given top priority in choosing the properties material presented in this volume. Hydrogen-energy systems cut across many energy related fields, e.g., nuclear fusion, magnetohydrodynamics, electrolysis of water, thermochemical decomposition of water, coal gasification, solar power, wind power, ocean energy, geothermal processes, etc. It is generally conceded that hydrogen could be used to satisfy virtually all fuel requirements that are currently being met with natural gas and oil. To satisfy the demand for properties data over this broad spectrum of interests, we have attempted to provide comprehensive coverage of physical properties over a wide range of pressures and temperatures. This new compilation provides 519 references, 62 data figures, and 30 data tables.

Chapter 1 is a heavily revised and updated version of NASA special publication SP-3089.* Tabulated data in this chapter have been revised to emphasize the higher temperature data for normal hydrogen and the lower temperature data for parahydrogen. This emphasis is necessary to provide coverage for a general audience that is interested in higher temperature processes (thermochemical decomposition, electrolysis, coal gasification, and other synthetic fuel production processes, etc.) as well as low temperature processes (cryogenic purification, subliming refrigerators, liquid transport and storage, etc.). NASA SP-3089 contained inconsistent and erroneous tabulated data for vapor pressures of normal hydrogen and for thermal conductivities, viscosities, thermal diffusivities, and Prandtl Numbers of fluid hydrogen in certain thermodynamic regions. These erroneous data have been eliminated in the new compilation, and appropriate uncertainty statements for each property have been included in the text. The source document for this chapter (NASA SP-3089) also contained numerous errors in text, formulae, tabular data, and figures. All errors have been eliminated in those portions of the original work that are included in this new compilation. In addition, new descriptive equations and computer codes were developed to generate the new data (tables and figures) for Chapter 1. This chapter deals with the thermally variant properties of liquid, liquid-vapor, vaporous, and gaseous hydrogen. These fluid state regions are illustrated by the speckled area on the density-temperature phase diagram that follows. Both normal (75% ortho and 25% para content) and parahydrogen (0.21% ortho and 99.79% para content) properties are presented.

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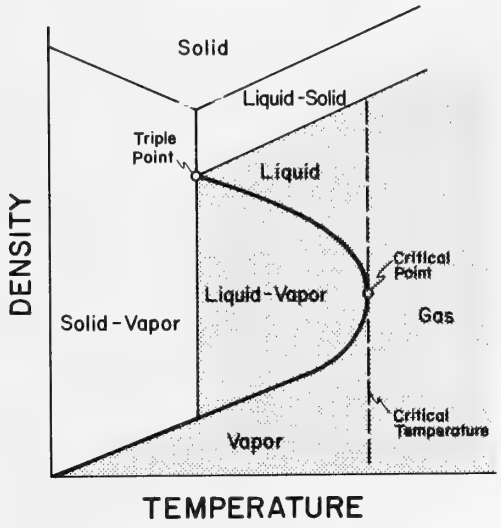
*See Reference 6.



Chapter 2 is a compilation of the thermophsical properties of solid-liquid, solid-vapor, and solid hydrogen. These thermodynamic states are illustrated by the non-speckled area on the accompanying density-temperature phase diagram. Again ortho-para modifications of the hydrogen molecule are taken into consideration in presenting the properties. As might be expected, there is some overlap of properties data (at the phase boundaries) between Chapters 1 and 2, but the redundancy is minimal and essential for continuity of the properties across phase boundaries.

Chapter 3 is a collection of chemical and physical data pertinent to the combustion characteristics of hydrogen. These data are frequently used to perform safety assessments of fuels in various applications; therefore, methane and gasoline properties are included for comparative purposes.

Chapter 4 is a compilation of various properties of hydrogen that could not logically be included in the first three chapters of this volume. Some of these properties address topics of major engineering significance, e.g., pressurization and heat transfer parameters, mixture properties, slush hydrogen technology, ortho-para modification, isotopes, etc.

Chapter 5 is a collection of the various figures and charts pertaining to the properties described in the first four chapters.

Chapter 6 collects the tables of properties as described in the first four chapters.

Chapter 7 provides the nomenclature for this volume and lists the conversion factors needed to use the miscellaneous units of data collected and presented herein. In a compilation of this type, it is not practical to convert the voluminous data to SI units. Also, opportunities for introducing new errors abound when constructing new SI figures from non-SI figures; therefore, most of the original figures and charts are used and are presented herein exactly as they appeared in their original publication. Consequently, a full mix of engineering and scientific units are retained. We have adhered to the SI system of units in those cases where new figures and tables have been generated for this volume. To accelerate the use of SI units, we have also provided dual units or SI unit conversion factors throughout the text where original non-SI data are reported or discussed.

The authors gratefully acknowledge the expert assistance of Mary J. Pritchard and Grace R. Darr in the preparation of the text and the artistic efforts of Lewis J. Ericks in composing many of the thermodynamic diagrams.

J. Hord
Boulder, CO
October 1980

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CHAPTER ONE

THERMOPHYSICAL PROPERTIES OF HYDROGEN FROM THE FREEZING LIQUID LINE TO 3000 K AND 100 MPa

Robert D. McCarty

1.1. INTRODUCTION

This chapter contains the available thermophysical properties of hydrogen in the liquid, liquid-vapor, and gaseous states. The work was performed at the Cryogenic Data Center of the National Bureau of Standards in Boulder, CO. The Cryogenic Data Center has been collecting data and documents pertinent to the field for 20 years and presently has about 120,000 coded entries which may be computer searched to give bibliographies on the physical properties of materials at low temperatures. A computer search of the data center holdings produced a bibliography for hydrogen of about 2,500 references. All of these references were considered; only selected references appear here as a result of the review and editing process.

The scope of this chapter is defined as all physical properties of fluid hydrogen (chemical properties were excluded).

Papers on engineering processes utilizing hydrogen were specifically excluded in the bibliographic search and subsequent review. The subject of hydrogen embrittlement of materials is not treated here (see Reference 1).

The level of review of the properties of hydrogen varies from the extensive tabulations of "critically evaluated" thermodynamic and transport properties to the selection of a few representative values from the literature by persons knowledgeable in the field. In the latter case the data selected were judged to be the most useful to the largest number of potential users of these data. For those who need to pursue the subject in greater detail, a list of references is provided.

1.1.1. DESCRIPTIVE SHEETS

These sheets serve as the starting point for the use of this chapter. For a given property each sheet usually contains the following:

A. A brief description or definition of the property to distinguish between similar sounding terms.

B. A locator of tabular values of the property. The range and units of the tables are given for convenience.

C. A locator of graphs and charts of the property.

D. Mathematical equations which represent the property provided that the functional form is simple.

E. One or more values of the property, usually at fixed points to illustrate the range of the property.

F. An estimate of uncertainty is usually given. It is made on a 2 σ level of probability. This means that there is a 95% chance that new experimental measurements (of equal or greater accuracy) of the property will fall within a 2 σ band of the quoted numbers. The estimate of the uncertainty of a property is seldom straightforward and is often made on the basis of the accuracy of the instrumentation used rather than the random scatter of a given set of data. In the case of a property that is tabulated over a wide range of pressures and temperatures, the stated uncertainty is for the most uncertain value, and the uncertainty of most of the tabular entries is much less. Exceptions to the above convention are noted individually on the descriptive sheets. The most common exception is the critical region where the uncertainty of most properties is greater than the stated value. In no case should the quoted uncertainty be associated with values from other than recommended sources or values extrapolated from the tables.

G. A list of references is given with each descriptive sheet.

1.1.2. FIGURES

Chapter 5 of this volume is a collection of hydrogen property charts and diagrams. These figures were taken from the literature in the original form of presentation; consequently, the units are a complete mix of SI, metric, and English. In most cases the prime purpose of the figures is to illustrate the behavior of a property over a wide range of pressures and temperatures. Although the figures will provide adequate values for rough calculations, the tabular values are recommended for precise calculations.

1.1.3. TABLES

Tables of properties are collected in Chapter 6 of this volume. The extensive tabulations of thermodynamic and transport properties cover the range from the triple point to 3000 K, with pressures to 100 MPa. They are presented in SI units for both para and normal hydrogen.

1.1.4. COMPUTER PROGRAMS AND EXTRAPOLATION

In many instances a computer program is a convenient source of property data. In other instances, particularly where a large number of values is needed in a short time, a computer program to furnish these values is a necessity. For these and other reasons, the use of computer programs to furnish fluid property data has steadily increased in recent years. This increased usage has resulted in a variety of computer programs. At the present time there does not seem to be a single program that will satisfy every need, and a choice must often be made on the basis of the particular

job requirements. Table 1 lists the more important fluid property programs for hydrogen and some of the pertinent information needed to select the proper program for a particular job. A column-by-column description of Table 1 is given below.

A. Column 1 lists four general methods used to computerize the thermodynamic properties of fluids. The linear interpolation method is, as the name implies, tabular interpolation of property values stored in the computer. This method is fast but not very accurate and requires more computer core storage than the other methods. The most accurate method, if programmed properly, is polynomial interpolation. The disadvantages of the polynomial method are a lack of versatility and slow computations relative to the other methods. A good compromise and a widely used method is the equation-of-state approach using a modified Benedict Webb Rubin (MBWR) equation. This method offers accuracies only slightly worse than the polynomial interpolation method and has the advantages of being faster and more versatile and giving a continuous, thermodynamically consistent surface. The main disadvantage of the MBWR is that it is functionally incorrect in the critical region, i.e.,

$$\rho = \rho_c \pm 20\% \text{ and } T = T_c \pm 5\%$$

The nonanalytic equation-of-state approach (no programs using this method are listed in Table 1) gives theoretically correct results in the critical region, but these equations are usually difficult to use.

B. Column 2 gives the range of validity of a program in terms of pressure and temperature limits. Extrapolation of these programs beyond the stated limits is not recommended. If properties are needed beyond the stated

range of validity, the list of references given for that property in Section 1.2 should first be scanned, as references to properties at extreme temperatures and pressures have been noted there. If extrapolation of one of the programs is necessary, the modified BWR equation of state is the most convenient to use and least likely to yield large errors.

C. The symbols used in column 3 are defined as follows:

P = pressure

T = temperature

ρ = density

H = enthalpy

S = entropy

λ = thermal conductivity

η = viscosity

C_p = specific heat capacity at constant pressure

C_v = specific heat capacity at constant volume

ε = dielectric constant

γ = surface tension

E = internal energy

RI = refractive index

ω = speed of sound

The units of the properties vary from program to program.

D. The accuracy of the properties calculated from these programs varies from property to property within a given program. The accuracies quoted in column 4 are for densities calculated from a P-T input. Since they are an estimate of the average accuracies, they are most useful as a basis of comparison with the other programs.

E. Column 5 is self-explanatory. Copies or use of the program may be obtained by contacting the agency listed.

F. For certain applications the mathematical continuity of the properties is important. In other words, the numbers coming from the program must not contain abrupt changes in the property or derivatives. Such requirements often occur in iterative calculations. If column 6 has a "no" in it, discontinuities may be expected.

G. The modification in column 7 refers to the relative orientation of the nuclear spin of the two hydrogen atoms in the molecule (see the explanation in Chapter 4 under ortho-para modifications).

H. The input to the various programs is given in column 8. The units of both input and output of the programs are not mentioned because in some cases a choice of units is available and in most cases the user converts the units to suit his/her particular need. An explanation of the input and output is furnished when the program is requested.

1.1.5. EVALUATION OF THE LITERATURE

The preparation of this review involved the evaluation of each reference to hydrogen data found in the literature. The Cryogenic Data Center's storage and retrieval system was queried for references pertaining to the physical properties of hydrogen (chemical properties excluded); this search yielded 2,543 references. The resulting bibliography from the Cryogenic Data Center was further cross referenced by property, which greatly aided the evaluation process.

In many cases preliminary examination of the bibliography for a given property was sufficient to determine whether or not an article should be included. In the final evaluation process a copy of each remaining article was then obtained, and evaluation was made on the basis of content of the article.

1.1.6. CRITICAL SELECTION OF "BEST VALUES"

When selecting so-called "best values" many factors must be considered. The first tendency is to equate "best" with most accurate; indeed, in some cases this is true, but in other cases it is not. For example, in many engineering problems a continuous and thermodynamically consistent set of properties is of utmost importance. This is not to say that accuracy is not important. In the selection process both factors were considered. Selections were made to provide the most accurate and consistent set of properties over the widest possible range of pressures and temperatures.

In that regard, Tables 2, 3, 8 and 9 are thermodynamically consistent and mathematically continuous. The properties given in these tables were calculated by means of a computer program (see Table 1) which is available from the Cryogenic Data Center.

1.1.7. ACKNOWLEDGMENTS

Much of this work was originally performed under the sponsorship of the Aerospace Safety Research and Data Institute of the NASA Lewis Research Center and was first published in 1975 as NASA SP-3089.[6] Many changes in format and content have been made for presentation in this revised compilation. The author is also indebted to many of his colleagues for their original contributions to the preparation of this chapter--specifically, V. J. Johnson, Phil Angerhofer, Mildred Birchfield, and Salli Schiffmacher of the NBS and Paul Ordin and George Mandel of the NASA.

1.2. DISCUSSION OF THE PROPERTIES

Hydrogen is the first element in the periodic table with the atomic number 1; therefore, it is the lightest of all gases. On the earth hydrogen occurs chiefly in combination with oxygen as water. It is the most abundant element in the universe. It is a colorless, tasteless, and odorless gas and liquefies at atmospheric pressure at 20.27 K. In recent years hydrogen has been used extensively as a chemical feedstock and as a rocket fuel in the space effort. It is now being seriously considered as a recyclable fuel substitute for petroleum and natural gas.

1.2.1. COMPRESSIBILITY COEFFICIENT[4,7,8]

Definition - The compressibility coefficient is defined as

$$-\frac{P}{V}\left(\frac{\partial V}{\partial P}\right)_T$$

Tables of Values - This quantity is not tabulated here, but it may be easily obtained by forming the product of P times the isothermal compressibility (see Subsection 1.2.4). The reciprocal of the isothermal compressibility, $V(\partial P/\partial V)_T$, is tabulated in Tables 2, 3, 8, and 9.

Units	Range of table		Table location
Dimensionless	13.8 - 3000 K	0.01-100 MPa	2, 8
Dimensionless	Saturation boundary		3, 9

Note: The tables reflect no differences for this property due to ortho-para modifications.

Figure - None

Equation - See Subsection 1.2.12

Range of Values - Para and normal

Units	Triple point		Boiling point		Critical point	RTP*
	Liquid	Vapor	Liquid	Vapor		
Dimensionless	7.79×10^{-5}	1.02	2.02×10^{-3}	1.12	∞	1.0

Uncertainty - For values derived from tables listed above, the uncertainty varies from 0% in the low density limit to about 3 to 4% at 35 MPa and 10% at 100 MPa. In the critical region ($T_c \pm 5\%$ and $\rho_c \pm 20\%$) the uncertainties are greater and very difficult to estimate as the property diverges at the critical point.

1.2.2. ACCOMMODATION COEFFICIENT[9]

Definition - The accommodation coefficient, a, is defined as the ratio $a = (E_i - E_r)/(E_i - E_r')$, where $(E_i - E_r)$ is the mean energy change of molecules colliding with a wall and $(E_i - E_r')$ is the mean energy change if the molecules come into thermal equilibrium with the wall.

Discussion - The accommodation coefficients of gases on solids are used to estimate heat conduction by gases at low pressures ($P \lesssim 13.0$ Pa). The accommodation coefficient is a function of the gas, temperature, and characteristics of the solid surface, especially the smoothness and cleanliness. In general, the lighter the gas, the higher the temperature and the smoother and cleaner the surface, the smaller is the value of the accommodation coefficient. The coefficient is independent of the pressure if the pressure is sufficiently high ($P \gtrsim 13.0$ Pa) to insure a monomolecular gas film on the solid surface.

*RTP = room (reference) temperature and pressure--300 K and 0.101325 MPa (1 atm).

Tables of Values - None

Figure - None

Equation - None

Range of Values -

Units	At room temperature P ≈ 13.0 Pa
Dimensionless	a = 0.311 on platinum[9]

Uncertainty - The uncertainty is estimated to be ±1%

1.2.3. COMPRESSIBILITY FACTOR[4,7,8]

Definition - The compressibility factor is defined as Z = PV/RT.

Tables of Values - This quantity is not tabulated but may be simply obtained by forming PV/RT from Tables 2, 3, 8, and 9.

Figure - 1

Equation - See Subsection 1.2.12

Range of Values -

	Triple point		Boiling point		Critical	
Units	Liquid	Vapor	Liquid	Vapor	point	RTP
Dimensionless	0.00161	0.9852	0.01712	0.9060	0.3024	1.0006

Uncertainty - The uncertainty of Z derived from the tables in Chapter 6 will correspond to the uncertainty of the PVT in the above tables. McCarty and Weber[7] estimated these uncertainties to be

Temperature range	Pressure range	Uncertainty in density
700 - 3000 K	1 - 100 MPa	1% (extrapolation)
300 - 700 K	1 - 35 MPa	0.5%
300 - 700 K	35 - 100 MPa	
13 - 300 K	1 - 100 MPa	0.1% (except critical region)
Critical region	$T_c \pm 5\%, \rho_c \pm 20\%$	6%

The uncertainties quoted here are for parahydrogen. The tables in Chapter 6 reflect no difference in Z between the normal and para modifications. To estimate the uncertainties for the normal hydrogen tables, add 0.1% for temperatures above 100 K, 0.2% for temperatures between critical and 100 K, and 0.4% for the compressed liquid region.

Ortho-para Differences[4,7]- There is probably a very small difference in densities (less than 0.1%) between the ortho and para modifications. An exception is the saturated vapor and liquid densities where the difference is larger due to a difference in the vapor pressure curve (see Chapter 4).

1.2.4. ISOTHERMAL COMPRESSIBILITY[4,7,8]

Definition - The isothermal compressibility is defined as

$$\beta_T = \frac{1}{V}\left(\frac{\partial V}{\partial P}\right)_T$$

Tables of Values - The reciprocal of the isothermal compressibility is given in Tables 2, 3, 8, and 9.

Units	Range of table		Table location[a]
MPa^{-1}	13.8 - 3000 K	0.01 - 100 MPa	2, 8
MPa^{-1}	Saturation boundary		3, 9

[a]To make the table entries positive, $-1/\beta_T$ is tabulated. The isothermal compressibility is a negative quantity.

Figure - None

Equation - See Subsection 1.2.12

Range of Values -

	Triple point		Boiling point		Critical	
Units	Liquid	Vapor	Liquid	Vapor	point	RTP
MPa^{-1}	-1.10×10^{-2}	-145	-1.99×10^{-2}	-11.1	∞	-10

Note: The tables in Chapter 6 reflect no differences in this property for the normal and para modifications.

Uncertainty - The uncertainty for values obtained from the tables in Chapter 6 varies from 0% in the low density limit to about 3 to 4% at 35 MPa and 10% at 100 MPa. In the critical region ($T_c \pm 5\%$ and $\rho_c \pm 20\%$) the uncertainties are much greater and very difficult to estimate as the property diverges at the critical point.

1.2.5. ADIABATIC COMPRESSIBILITY[4,7,8]

Definition - Adiabatic compressibility is defined as

$$\beta_S = -\frac{1}{V}\left(\frac{\partial V}{\partial P}\right)_S$$

A useful relation is

$$\beta_S = \frac{C_v}{C_p}\beta_T$$

where β_T is the isothermal compressibility.

Tables of Values - This quantity is not tabulated, but it may be obtained by means of the relationship $\beta_S = 1/\rho W^2$, where ρ is density and W is sound velocity, from the tables listed below.

Units	Range of table		Table location
MPa^{-1}	13.8 - 3000 K	0.01 - 100 MPa	2, 8
MPa^{-1}	Saturation boundary		3, 9

Figure - None

Equation - None

Range of Values -

Units	Triple point Liquid	Triple point Vapor	Boiling point Liquid	Boiling point Vapor	Critical point	RTP
Para MPa^{-1}	0.00807	8.56	0.0119	5.93	∞	7.29

Uncertainty - The uncertainty in the compressed liquid varies between 2% at low pressures to 4% at high pressures; in the gas, well above the critical temperature, it is 1%. In the critical region ($T_c \pm 5\%$ and $\rho_c \pm 20\%$) the uncertainties are undoubtedly larger; however, they are not experimentally defined as the property diverges at the critical point.

1.2.6. DIELECTRIC CONSTANT[10-19]

Definition - The dielectric constant of a material may be defined as $\varepsilon = C(P,T)/C(0,T)$, where C(P,T) is the capacitance of a capacitor whose plates are separated by the material at pressure P and temperature T, and C(0,T) refers to the capacitance of the same capacitor in a vacuum. In practical situations corrections are often applied for pressure distortion of the capacitor. The equation assumes no stray capacitances, i.e., the electric field is affected only by the dielectric material. Note: The dielectric constant is also known as specific inductive capacity.

Tables of Values - This quantity is tabulated in the tables in Chapter 6.

Units	Range of table		Table location
Dimensionless	0.01 - 100 MPa	13.8 - 3000 K	2, 8
Dimensionless	Saturation boundary		3, 9

Figure - 2 and 3

Equation - The dielectric constant for the fluid parahydrogen may be calculated from

$$\frac{\varepsilon - 1}{\varepsilon + 2} = A\rho + B\rho^2 + C\rho^3$$

where A = 0.99575, B = -0.09069, C = 1.1227, and ε is the dielectric constant. The density , ρ , must be in the units of grams per cubic centimeter. The equation is valid over the range of the tables and may be extrapolated in the fluid phase with reasonable results.

Range of Values -

	Triple point			Boiling point		Critical	
Units	Liquid	Vapor	Solid	Liquid	Vapor	point	RTP
Dimensionless	1.252	1.0004	1.285	1.229	1.004	1.0980	1.00025

Uncertainty - The uncertainty of $\varepsilon - 1$ is estimated to be no greater than 0.1% for the fluid phase and 0.2% for the solid phase.

1.2.7. DIELECTRIC BREAKDOWN

Liquid[20-29] - Below some critical electric field gradient, called the "breakdown voltage," hydrogen is an insulator. In recent years there have been a few experiments to determine this breakdown voltage for liquid hydrogen. Two things seem evident from these experiments. First, there is a fairly large dispersion in the measurements (reproducibility in a single experiment commonly has a 25% scatter); second, the breakdown voltage is quite sensitive to pressure changes, i.e., an increase from 300 to 690 kV/cm was observed when the pressure was increased from 0.101325 to 0.506625 MPa (1 to 5 atm) at 20 K.[23]

Gas[20,21,23,28,30-44]- Hydrogen in the gaseous phase is, like the liquid, an insulator below some critical field gradient. When the critical voltage is reached, the gas ionizes, a corona results, and the conduction takes place. This breakdown voltage follows Paschen's law, which states the breakdown voltage, V, does not change as long as ρd is a constant and it is proportional to ρd, i.e., $V \propto \rho d$, where ρ is the density and d is the electrode spacing. This relation is surprisingly independent of temperature, although some investigators claim to have observed temperature dependence at low temperatures. Also, a minimum breakdown voltage for hydrogen has been observed at about 250 to 300 V at a ρd of 10^{-7} g/cm^2.

Electrical Conductivity[29,45-50]

Hydrogen is essentially an insulator with a negligible electrical conductance except when voltages in excess of the breakdown voltages are applied. At elevated temperatures where ionization occurs, the gas becomes an electrical conductor, and conductivities for hydrogen to 30,000 and 40,000 K have been calculated.[36,37] A significant experimental paper on electrical conductivity of the liquid is that of Willis.[47]

1.2.8. DIFFUSION COEFFICIENT

Definition - The diffusion coefficient is defined as the coefficient relating the flux of a given species in a mixture to the concentration gradient of the species under isothermal conditions. For a binary mixture of species i and j: $J_i = -D_{ij}$ grad C_i, where J_i is the mass flux of i, C_i is the gradient of concentration, and D_{ij} is the diffusion coefficient. Diffusion is usually thought of as a property of mixtures; however, the term self-diffusion, as the name implies, refers to a diffusion of a single

species. There is, of course, no true means of measuring such a quantity, so the process is simulated using different isotopes of the same species. A third type of diffusion appears in the literature for hydrogen where the binary mixture is that of molecules with different nuclear spin orientation, i.e., ortho-para mixtures.

Thermal Diffusion

Definition - In a binary system where a temperature gradient exists, the above equation should be extended to $J_i = -D_{ij}\nabla C_i - D^T_{ij}\nabla \ln T$, where D^T_{ij} is the thermal diffusion coefficient. The same extension is made to isotopic and ortho-para mixtures.

The information on the diffusion of hydrogen has been categorized according to the above definitions; references are listed below.

Equations - From kinetic theory, for a dilute gas $D_{ij} \propto T^{3/2}$, and at room temperature D_{ij} for hydrogen systems is about 1 cm^2/s; T is temperature. For liquid or gas dissolved in a liquid

$$\frac{D_{ij}\eta}{T} = \text{constant}$$

where η is the viscosity of the mixture and T is temperature. D_{ij} for H_2 in a liquid is about $10^{-4} cm^2/s$.

References -

A. Diffusion

1. Isothermal[51-55]

2. Thermal

a. Argon[56-59]

b. Krypton[54,56,58,59]

c. Xenon[58,60-64]

d. CO_2[57,65-67]

e. SO_2[53]

f. H_2O[53,68]

g. N_2O[69]

h. O_2[70,71]

i. CO[71]

j. N_2[57,58,64,66,67,70-73]

k. Ne[74,75]

l. (He^4)[58,64,70,71,76-84]

m. (He^3)[59]

B. Self-diffusion

1. Isothermal[55,79,80,85-89]

a. High temperatures[37,90]

b. Solids[91]

2. Thermal[57,76-78,80,92-101]

3. Ortho-para[84,99,100,102]

1.2.9. THERMAL DIFFUSIVITY[4,7,8]

Definition - The thermal diffusivity, α, is defined as

$$\alpha = \frac{\lambda}{\rho C_p}$$

where λ is the thermal conductivity, ρ is the density, and C_p is the specific heat capacity at constant pressure.

Tables of Values - This quantity is tabulated in the tables in Chapter 6.

Units	Range of table		Table location
m^2/h	13.8 - 3000 K	0.01 - 100 MPa	2, 8
m^2/h	Saturation boundary		3, 9

Figure - None

Equation - None, except above and the equation of state (see Subsection 1.2.12).

Range of Values -

	Triple point		Boiling point		Critical	
Units	Liquid	Vapor	Liquid	Vapor	point	RTP
m^2/h	0.00053	0.034	0.00052	0.0038	0	0.57

Note: Values for normal and para are the same at these state points but differ at other state points.

Uncertainty - The uncertainty of the values tabulated in Chapter 6 is estimated to be $\pm$14%, except in the critical region (T_c $\pm$5% and ρ_c $\pm$20%) and for $T \leq 100$ K and $P > 35$ MPa where the uncertainty is unknown.

1.2.10. ENTHALPY[4,7,8]

Definition - Enthalpy is defined by the equation $H = U + PV$, where U is the internal energy, H is the enthalpy, and PV is the product of pressure and volume. The change in enthalpy is a measure of the heat absorbed by a system in a constant pressure process. The enthalpy of a substance is a derived thermodynamic property and may be calculated by means of a thermodynamic relationship which requires the PVT surface (see Subsection 1.2.12) and the specific heat capacity (see Subsections 1.2.16 through 1.2.19).

Tables of Values - Tabulated in Tables 2, 3, 8, and 9.

Units	Range of table		Table location
J/g	13.8 - 3000 K	0.01 - 100 MPa	2, 8
J/g	Saturation boundary		3, 9

Figure - 4, T-S chart (para); 5, T-S chart (para); 6, T-S chart (normal); 7, T-S chart (normal); 8, T-S chart (normal).

Equation - None (see above)

Range of Values - The reference state for enthalpy is zero for the ideal gas at zero absolute temperature (see Subsection 1.2.20).

	Triple point		Boiling point		
Units	Liquid	Vapor	Liquid	Vapor	RTP
Para					
J/g	-308.8	140.3	-256.3	189.3	4199.4
Normal					
J/g	218.3	667.4	270.9	716.5	4226.9

Uncertainty - The uncertainties of the enthalpy values tabulated here vary somewhat with pressure and temperature. In the region of $T<300$ K, uncertainty is estimated to range from 1.2 J/g at low densities to about 5.0 J/g in the liquid. For all densities at $300<T<500$ K the uncertainty is estimated to vary from 1 J/g at low pressures to about 15 J/g at the highest pressures. For temperatures above 500 K the uncertainty of the enthalpy at the lower densities could be much greater, especially for temperatures above about 1800 K where dissociation is a large factor.

1.2.11. ENTROPY[4,7,8,110]

Definition - Entropy is defined by the equation dS = dQ/T, or in any reversible process the change in entropy of a system is equal to the heat which it absorbs, divided by the absolute temperature. The entropy of a substance is a derived thermodynamic quantity, and many thermodynamic equations exist which relate the PVT surface of a substance to the changes in entropy. In addition to the PVT surface, or an equation of state, the specific heat capacity of a substance is needed to complete the calculation.

Tables of Values - This quantity is tabulated in Tables 2, 3, 8, and 9.

Units	Range of table		Table location
J/g-K	13.8 - 3000 K	0 - 100 MPa	2, 8
J/g-K	Saturation boundary		3, 9

Figure - 4, T-S chart (para); 5, T-S chart (para); 6, T-S chart (normal); 7, T-S chart (normal); 8, T-S chart (normal).

Equation - None (see definition)

Range of Values - The reference state for entropy is the ideal gas at 0.101325 MPa (1 atm) pressure and zero absolute temperature (see Subsection 1.2.20).

	Triple point		Boiling point		
Units	Liquid	Vapor	Liquid	Vapor	RTP
Para					
J/g-K	4.964	37.52	7.977	29.97	64.77
Normal					
J/g-K	14.08	46.64	17.09	39.08	70.58

Uncertainty - The uncertainty of the entropy values tabulated here varies somewhat with pressure and temperature. In the region T<300 K, the uncertainty is estimated to range from 0.04 J/g-K at low pressures to 0.17 J/g-K at the higher pressures. For all P at 300<T<500 K the uncertainty

is estimated to vary from 0.05 J/g-K at low pressures to about 1.0 J/g-K at the highest pressures. For temperatures above 500 K the region is again one of extrapolation and the uncertainties are greater, especially for the low pressures at temperatures above 1800 K where dissociation becomes significant.

Figures 6, 7, and 8 are the best available T-S diagrams for normal hydrogen. These data will differ from those presented in Tables 8 and 9 because the tables and the figures are derived from different references; however, both the tables and the figures are internally consistent so that either the figures or the tables may be used for engineering calculations, but data should not be transposed or transferred from one to the other.

1.2.12. EQUATION OF STATE[2,4,7,8,103-105]

Definition - The relationship between the pressure, temperature, and density of a substance is called the equation of state. This section will be concerned with the mathematical model of the equation of state. Because of the speed and availability of today's digital computers, the mathematical equation of state is an extremely useful tool. There are literally hundreds of these to be found in the literature. To recommend an equation of state, the detailed requirements must be known, or, to put it another way, there is no single mathematical model of the equation of state that will be the best choice for every purpose.

Equations - For the equations used to generate Tables 2, 3, 8, and 9, see References 4, 7, 8, and 104, 105. For a more versatile but not quite as accurate equation of state, see Reference 2. For an equation of state designed for extremely high-speed computation but less accuracy, see Reference 103. See also the main text on computer programs and Subsection 1.2.13.

1.2.13. VIRIAL COEFFICIENTS[4,7,8]

Definition - The virial coefficients are commonly defined in two ways, as follows: $P = RT\rho[1 + B(T)\rho + C(T)\rho^2 + ...]$ and $PV = RT + B'(T)P + C'(T)P^2$. The first two terms of these series may be inverted by the following:

$$B(T) = B'(T) \text{ and } C'(T) = \frac{C(T) - B(T)^2}{RT}$$

where P is pressure; T is temperature; ρ is density; V is $1/\rho$; R is the gas constant; and B(T), B'(T) and C(T), C'(T) are virial coefficients of a power series expansion in density and pressure, respectively. Both series are theoretically infinite in length; however, the coefficients beyond the first two [B(T) and C(T)] are of less interest because of their complexity. The temperature at which B(T) = 0 is called the Boyle temperature. Either of the above two equations is adequate to describe the PVT surface for densities up to about one half the critical density. The coefficients B(T) and C(T) for the density expansion are given in Table 4. Most equations of state may be algebraically arranged so that they are in a virial expansion form; therefore, these equations of state may be used to calculate the virial coefficients (see Subsection 1.2.12 for equations of state).

Tables of Values -

Units	Range of table	Table Location
$B(cm^3/mol)$, $C(cm^3/mol)^2$	14 - 500 K	4

Figure - None

Equation - The values in Table 4 have been calculated from the following expressions. For temperatures below 100 K,

$$B(T) = (b_1T + b_2 + b_3/T + b_4/T^2)/RT$$

where $b_1 = 1.9397741 \times 10^3$, $b_2 = -1.9279522 \times 10^5$, $b_3 = -2.2890051 \times 10^6$, $b_4 = 1.1094088 \times 10^7$, R = 82.0597 cm^3-atm/mol - K and T = Kelvin temperature.

For T<55 K,

$$C(T) = (C_1T^2 + C_2T + C_3 + C_4/T + C_5/T^2 + C_6/T^3)/RT$$

There are two sets of C_i coefficients: one for temperatures below T_c = 32.957,

$$C_1 = 1.0541776 \times 10^5$$

$$C_2 = -1.6597141 \times 10^7$$

$$C_3 = 1.0431411 \times 10^9$$

$$C_4 = -3.2538718 \times 10^{10}$$

$$C_5 = 5.1405848 \times 10^{11}$$

$$C_6 = -3.3123453 \times 10^{12}$$

and a second set for temperatures between T_c and 55 K,

$$C_1 = 1.6971294 \times 10^3$$

$$C_2 = -5.0854223 \times 10^5$$

$$C_3 = 6.7284118 \times 10^7$$

$$C_4 = -3.8045171 \times 10^9$$

$$C_5 = 1.0789413 \times 10^{11}$$

$$C_6 = -1.1515642 \times 10^{12}$$

For 55<T<100,

$$C(T) = a_1 e^{a_2/T} [1 - e^{a_3 \{1-(T/a_4)^{a_5}\}}]$$

where $a_1 = 388.682$, $a_2 = 45.5$, $a_3 = 0.6$, $a_4 = 20.0$, and $a_5 = 4.0$.

For temperatures above 100 K,

$$B(T) = \sum_{i=1}^{4} b_i x_i^{(2i-4)/4}$$

and

$$C(T) = C_o x_2^{1/2} \quad [1 + C x_2^3] \; [1 - \exp(1 - x_2^{-3})]$$

where $b_1 = 42.464$, $b_2 = -37.1172$, $b_3 = -2.2982$, $b_4 = 3.0484$, $x_1 = 109.781/T$, $C_o = 1310.5$, $C = 2.1486$, and $x_2 = 20.615/T$.

Range of Values -

Units	20K	100 K	200 K	300 K
$B(T) cm^3/mol$	146.7	-2.51	10.73	14.38
$C(T)(cm^3/mol)^2$	-1503	608.6	421.7	343.8

Boyle Point (B = 0) - 112.4 K

Uncertainty - The uncertainty of B is probably a maximum of 5% at the highest and lowest temperatures. The uncertainty of C is a minimum of 5% between 55 and 100 K and as much as 20% for temperatures below critical temperature.

1.2.14. INTERMOLECULAR POTENTIAL FUNCTION[106-109]

Definition - The intermolecular potential function is the potential energy of interaction that exists between pairs of molecules. Mathematical models of this function are used to calculate macroscopic properties with kinetic theory and statistical mechanics.

General Comments - The potential energy of interaction between unlike molecules, i.e. hydrogen and some other fluid, has not been considered here. Only those papers with some relevance to $H_2 - H_2$ interactions have been used.

The Lennard-Jones Potential - The most common potential in the literature is the Lennard-Jones or 12-6 potential

$$\phi(r) = 4\varepsilon \left[\left(\frac{\sigma}{r} \right)^{12} - \left(\frac{\sigma}{r} \right)^{6} \right]$$

where $\phi(r)$ is the potential energy of interaction, r is the intermolecular separation, ε is the maximum energy of attraction, and σ is the intermolecular separation for which $\phi(r) = 0$. σ is sometimes referred to as the molecular diameter. Typical values for hydrogen[106] are $N\sigma = 15.6$ cm^3/mol and $\varepsilon/K = 36.7$ where N is Avogadro's number and K = Boltzmann's constant. The above parameters for the Lennard-Jones potential have been shown[107] to be temperature and property dependent. A new potential model has been developed[108,109] which has shown significant improvement over the Lennard-Jones; unfortunately, parameters for hydrogen are not yet available.

1.2.15. FIXED POINTS[4,19,110-112]

Discussion - Below is a summary of the P-ρ-T data at selected fixed points. To be consistent with the property tables in Chapter 6, the temperatures in the para-equilibrium column are on the NBS-55 scale. The temperatures in the column labeled "normal" are also on the NBS scale. For relationships between the IPTS-68 scale and the NBS-55 scale, see Reference 112.

	Para or equilibrium	Normal
Critical point		
	T = 32.976 $\pm$ 0.05 K	33.19 K
	P = 1.2928 MPa (12.759 atm)	1.315 MPa (12.98 atm)
	ρ = 31.43 kg/m^3 (15.59 mol/L)	30.12 kg/m^3 (14.94 mol/L)
Normal boiling point		
	T = 20.268 K	20.39 K
	P = 0.101325 MPa (1 atm)	0.101325 MPa (1 atm)
	ρ(liquid) = 70.78 kg/m^3 (35.11 mol/L)	71.0 kg/m^3 (35.2 mol/L)
	ρ(vapor) = 1.338 kg/m^3 (0.6636 mol/L)	1.331 kg/m^3 (0.6604 mol/L)
Triple point		
	T = 13.803 K	13.957 K
	P = 0.00704 MPa (0.0695 atm)	0.00720 MPa (0.0711 atm)
	ρ(solid) = 86.50 kg/m^3 (42.91 mol/L)	86.71 kg/m^3 (43.01 mol/L)
	ρ(liquid) = 77.03 kg/m^3 (38.21 mol/L)	77.2 kg/m^3 (38.3 mol/L)
	ρ(Vapor) = 0.126 kg/m^3 (0.0623 mol/L)	0.130 kg/m^3 (0.0644 mol/L)

Solid-solid Transition - Solid hydrogen does undergo such transitions (see, for example, Reference 19).

Molecular Weight - 2.01594 on the C^{12} scale.[111]

Other Properties at the Fixed Points - See Tables 2, 3, 5, 8, 9, and 10.

1.2.16. SPECIFIC HEAT (HEAT CAPACITY) AT CONSTANT PRESSURE[4,7,8]

Definition - The heat capacity at constant pressure is defined as $C_p = (\partial H/\partial T)_p$, where H is enthalpy.

Tables of Values -

Units	Range of values		Table location
J/g-K	13.8 - 3000 K	0.1 - 100 MPa	2, 3, 8, 9

Figure - 9, 10

Equation - None

Range of Values -

	Triple point		Boiling point		Critical	
Units	Liquid	Vapor	Liquid	Vapor	point	RTP
Para						
J/g-K	6.36	10.52	9.66	12.15	∞	14.85
Normal						
J/g-K	6.36	10.52	9.66	12.15	∞	14.31

Uncertainty - The uncertainty is estimated to vary from 0.02% in the low density limit to 3% at 35 MPa and 8% at 100 MPa. In the critical region ($T_c \pm 5\%$, $\rho_c \pm 20\%$) the uncertainties are greater but difficult to estimate.

1.2.17. SPECIFIC HEAT (HEAT CAPACITY) AT CONSTANT VOLUME[4,7,8]

Definition - The heat capacity at constant volume is $C_v = (\partial U/\partial T)_v$, where U is internal energy, T is temperature, and v is specific volume.

Tables of Values -

Units	Range of tables		Table location
J/g-K	13.8 - 3000 K	0.01 - 100 MPa	2, 3, 8, 9

Figure - 11, 12

Equation - None

Range of Values -

	Triple point		Boiling point		Critical	
Units	Liquid	Vapor	Liquid	Vapor	point	RTP
Para						
J/g-K	4.67	6.21	5.78	6.50	∞	10.72
Normal						
J/g-K	4.67	6.21	5.78	6.50	∞	10.18

Uncertainty - The uncertainty is estimated to vary from 0.02% in the low density limit to 3% at 35 MPa and 8% at 100 MPa. In the near critical region ($T_c \pm 5\%$, $\rho_c \pm 20\%$) the uncertainties are greater but difficult to estimate.

1.2.18. SPECIFIC HEAT RATIO[4,7,8]

Definition - $\gamma = C_p/C_v$

Tables of Values - The specific heat ratio is not tabulated in the tables; however, C_p and C_v are tabulated and should be used to form the ratio as defined above.

Figure - None

Equation - None

Range of Values -

Units	Triple point Liquid	Triple point Vapor	Boiling point Liquid	Boiling point Vapor	Critical point	RTP
Para						
Dimensionless	1.38	1.69	1.69	1.88	∞	1.38
Normal						
Dimensionless	1.38	1.69	1.69	1.88	∞	1.41

Uncertainty - The uncertainty is estimated to vary from 0.02% in the low density limit to 3% at 35 MPa and 8% at 100 MPa. In the near critical region ($T_c \pm 5\%$, $\rho_c \pm 20\%$) the uncertainties are greater but difficult to estimate.

1.2.19. SPECIFIC HEAT (HEAT CAPACITY) OF THE SATURATED LIQUID AT CONSTANT SATURATION[113]

Definition - $C_\sigma = T(\partial S/\partial T)_\sigma = (dH/dT)_\sigma - V(dP/dT)_\sigma$ where the subscript σ denotes constant saturation.

Tabulated Values - None

Figure - None

Equation -

$$C_\sigma = \frac{AT}{(T_c - T)^n} + B + CT + DT^2 + ET^3 + FT^4 + GT^5$$

where T is temperature in kelvin, n = 0.10, A = 1.6815742, B = -32.80279, C = 6.8169871, D = -0.73194341, E = 0.033574357, F = -0.0007682974, G = 0.0000069029224, and T_c = 32.984. C_σ is cal/mol-K.*

Units	Triple point	Boiling point	Critical point
Para only			
J/g-K	6.33	9.59	∞

Uncertainty - The uncertainty is estimated by Younglove and Diller[113] to be 0.3% except near the critical point.

1.2.20. IDEAL GAS PROPERTIES, THERMODYNAMIC[110]

Discussion - All properties tabulated here are based on thermodynamic properties of the ideal gas. These ideal gas properties are derived from spectroscopic measurements and statistical mechanics; they are taken from Reference 110. The reference state for these properties is the ideal gas at 0 K where the molar internal energy, E_o°, is at its lowest quantized value. By convention the values of S°, C_p°, $-(F^\circ - E_o^\circ)/T$ and $H^\circ - E_o^\circ$ are tabulated[110] for 0.101325 MPa (1 atm) pressure; S° is molar entropy, C_p° is molar heat capacity at constant pressure, F° is molar free energy, H° is molar enthalpy and T is kelvin temperature. All symbols refer to the ideal gaseous state.

Tables of Values - For normal, equilibrium and parahydrogen, see Reference 110.

Properties	Units	Range of table	Table location
C_p°, S°, $-(F^\circ-E_o^\circ)/T$	Cal/mol-K*	10-5000 K	Reference 110
$H^\circ-E_o^\circ$	Cal/mol**		

Figure - None

---

*(Cal/mol-K) x 2.0755 = J/g-K

**(Cal/mol) x 2.0755 = J/g

Equation - None

Uncertainty - The uncertainty for C_p° is estimated to be 0.2% to 700 K increasing to 0.4% at 5000 K. The uncertainty for S° and E_o° is estimated to be an order of magnitude less.

1.2.21. INDEX OF REFRACTION[7,114]

Definition - The index of refraction n_λ of a medium is the ratio of the speed of light in a vacuum to the speed of light in the medium, $n_\lambda = C/C_m$.

Discussion - The refractive index of a nonpolar fluid depends on the wavelength of the incident light, the density of the fluid and, to a lesser extent, the temperature. The dependence on temperature is usually small enough to be neglected, as it has been in the equation given below. Figure 13 gives an indication of the temperature dependence for parahydrogen. Reference 7 gives a comparison between the index of refraction for normal and parahydrogen.

Table of Values -

Units	Range of values	Table location
Dimensionless	Saturated liquid (Para)	6

Figure - 13.

Equation -

$$n_\lambda(\rho) = \left(\frac{2\rho r_\lambda(\rho) + 1}{1 - \rho r_\lambda(\rho)}\right)^{1/2}$$

where $r_\lambda(\rho) = 0.99575 - 0.09069\rho + 1.227\rho^2 + 0.7799569 \times 10^6/\lambda^2 + 0.495126 \times 10^{12}/\lambda^4$, the specific refraction $r_\lambda(\rho)$ is in cubic centimeters per gram, densities are in grams per cubic centimeter, and the wavelengths, λ, are in angstroms*.

*Angstrom x 10^{-10} = meter

Range of Values -

Units	Boiling point liquid	RTP	λ
Dimensionless	1.1137	1.0001	435.8 nm (4358 angstroms)

Uncertainty - The uncertainty of the tabulated values is estimated to be less than 0.1%.

1.2.22. INTERNAL ENERGY[4,7,8]

Definition - Internal energy is defined by the equation $\Delta U = Q - P\Delta V$, where Q is the heat absorbed in a system, ΔU is the change in internal energy, P is the pressure, and ΔV is the change in volume. The internal energy of a system is a derived thermodynamic property and may be calculated by means of thermodynamic relationships which require the PVT surface (see Subsection 1.2.12) and the specific heat capacity (see Subsections 1.2.16 through 1.2.19). The most common method of calculating the internal energy is by using $H = U + PV$ where H is the enthalpy (see Subsection 1.2.10) and PV is the pressure volume product.

Tables of Values -

Units	Range of values		Table location
J/g	13.8 - 3000 K	0.1 - 100 MPa	2, 8
J/g	Saturation boundary		3, 9

Figure - None

Equation - None, see definition

Range of Values - The reference state for internal energy is zero for the ideal gas at zero absolute temperature (see Subsection 1.2.20).

Units	Triple point Liquid	Triple point Vapor	Boiling point Liquid	Boiling point Vapor	RTP
Para					
J/g	-309.0	84.2	-257.7	113.6	2961.38
Normal					
J/g	218.2	611.4	269.5	640.7	2989.0

Uncertainty - The uncertainty of the internal energy values tabulated here is estimated to be the same as the enthalpy (see Subsection 1.2.10).

1.2.23. JOULE-THOMSON COEFFICIENT[4,7,8,115]

Definition - The Joule-Thomson coefficient, μ, is defined as $\mu = -C_p^{-1}(\partial H/\partial P)_T = (\partial T/\partial P)_H$. The sign of μ indicates whether a gas expansion will cause an increase or decrease in the temperature. If μ is positive, the expanding gas will be cooled. The locus of points where $\mu = 0$ is called the Joule-Thomson inversion curve. These data are given in Table 7. Values of the Joule-Thomson coefficient are tabulated by Michels et al.[115] for pressures up to 253.31 MPa (2500 atm).

Tables of Values - This quantity is not tabulated here but it may be calculated from the property tables in Chapter 6.

Figure - 14, the inversion curve, T vs. P for parahydrogen.

Equation - None (may be calculated using an equation of state)

Range of Values -

Units	Pressure	40 K	110 K	180 K
K/MPa	10.1325 MPa	-0.424	0.247	-0.075
(K/atm)	(100 atm)	(-4.3×10^{-2})	(2.5×10^{-2})	(-7.6×10^{-3})

Uncertainty - The uncertainty is estimated to be 5%.

1.2.24. HEATS OF TRANSITION[4,7,8,19,116,117,129,130]

Definition - A heat of transition is equated to the energy associated with a phase change. In addition to the solid-liquid (fusion), solid-vapor (sublimation) and liquid-vapor (vaporization) transitions, hydrogen has two known solid-solid transitions.[19] The energy changes due to these solid transitions are not known but are thought to be small. For values of the latent heats of fusion[19,116,117] and sublimation[19,129,130] see Chapter 2. The latent heat of vaporization is presented in Subsection 1.2.25.

1.2.25. LATENT HEAT OF VAPORIZATION[4,7,8,19]

Definition - The latent heat of vaporization is the amount of heat required to convert a unit mass of a substance from the liquid to the vapor state at constant pressure.

Tables of Values - This quantity is not tabulated but values are easily obtained from Tables 3 and 9 by subtracting the liquid enthalpy from that of the vapor at the same temperature and pressure.

Figure - 15, 16, heat of vaporization vs. T.

Equation - None

Range of Values -

Units	Triple point	Boiling point	Critical point
Para			
J/g	448.2	445.5	0
Normal			
J/g	449.1	445.6	0

Uncertainty - The uncertainty is estimated to be 1.24 J/g for para and 2.5 J/g for normal.

1.2.26. MELTING CURVE[7,8,19,118]

Definition - The melting curve is the boundary between the solid and liquid regions in a phase diagram.

Tables of Values - The density of the saturated liquid in coexistence with the solid phase is found on the first line of each page of isobar data in Tables 2 and 8. The liquid and solid densities of three state points are given here. For more extensive tabulations, the reader is referred to Reference 19.

Figure - 17 and 18

Equation - See subsection 1.2.27 for melting pressures

Range of Values -

	Triple point		10.1325 MPa (100 atm)		30.3975 MPa (300 atm)	
Units	Liquid	Solid	Fluid	Solid	Fluid	Solid
kg/m^3	77.0	86.9	81.8	89.9	88.7	96.0

Note: These values are for parahydrogen. For an estimate of normal-para density differences, see Chapter 4.

Uncertainty - The uncertainty is estimated to be 0.1% for the liquid phase and 0.5% for the solid phase.

1.2.27. MELTING PRESSURE[7,14,19,119,120]

Definition - The relationship between pressure and temperature along the solid-liquid boundary.

Tables of Values - The melting temperature for a given pressure is found on the first line of each page of isobar data in Tables 2 and 8.

Units	Range of table	Table location
MPa	13.8 - 34.2 K	2, 8

Figure - 17 and 18, melting curve (T vs. P) for parahydrogen.

Equation - See Reference 7

Range of Values -

Units	Triple point	20 K	50 K
MPa	0.00704	22.71	221.1

Uncertainty - The uncertainty of the pressures is about 0.1%.

1.2.28. PHASE DIAGRAM[4,7,8]

Definition - Phase diagrams indicate the boundaries between the solid, liquid, and gas phases. The diagrams that were referenced here are only those which yield the PVT of the phases. For a diagram of the phases in other coordinates, consult the subsection on the particular property desired.

Figure - 19 and 20

Uncertainty - The uncertainty of values taken from the above (or any other) diagrams is determined by the resolution of the individual chart.

1.2.29. VOLUME EXPANSIVITY[4,7,8]

Definition - the volume expansivity is defined as

$$\beta = \frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P$$

Volume expansivity is often simply called expansivity or coefficient of volume expansion. The property is one of the compressibilities of a gas, where here the path (condition) of the compression is at constant pressure.

Tables of Values - This quantity is tabulated in Tables 2, 3, 8, and 9.

Units	Range of table		Table location
K^{-1}	13.8 - 3000 K	0.01 - 100 MPa	2, 8
K^{-1}	Saturation boundary		3, 9

Figure - None

Equation - None

Range of Values -

	Triple point		Boiling point		Critical	
Units	Liquid	Vapor	Liquid	Vapor	point	RTP
Para and Normal						
K^{-1}	0.0102	0.0752	0.0164	0.0642		0.00333

Uncertainty - The uncertainty in the compressed liquid is 2 to 3%; in the gas and supercritical fluid, 1 to 2%. In the critical region ($T_c \pm 5\%$, $\rho_c \pm 20\%$) the uncertainties are larger; however, they are not experimentally defined since the property diverges at the critical point.

1.2.30. PRANDTL NUMBER[7]

Definition - The Prandtl number, Pr, is defined by the relation $Pr = C_p\eta/\lambda$, where C_p is the specific heat at constant pressure, η is the viscosity, and λ the thermal conductivity.

Tables of Values -

Units	Range of table		Table location
Dimensionless	13.8 - 3000 K	0.01-100 MPa	2, 8
Dimensionless	Saturation boundary		3, 9

Figure - 21 and 22

Equation - None, other than above defining relationship

Range of Values -

Units	Triple point Liquid	Triple point Vapor	Boiling point Liquid	Boiling point Vapor	Critical point	RTP
Dimensionless	2.24	0.623	1.29	0.809	∞	0.685

Uncertainty - The uncertainty is estimated to be 17% except in the critical region, where it is greater. All data at pressures greater than 35 MPa and at temperatures below 200 K are extrapolated (uncertainty unknown).

1.2.31. PVT[4,7,8,110]

Definition - PVT stands for pressure, volume, and temperature, the fundamental variables of the state of a pure fluid at equilibrium. Any two of three variables may be specified; the third is then a unique value for a given fluid, except where two or more phases coexist, in which case the pressure is a unique function of the temperature, but the volumes of the phases differ.

Tables of Values - The properties are tabulated in Tables 2, 3, 8, and 9.

Figure 1, 19, and 20.

Equation - See Subsections 1.2.12., 1.2.13., 1.2.27., and 1.2.38.

Range of Values -

Property	Units	Range of tables	Table location
Pressure	MPa	0.01 - 100	2, 8
Volume	m^3/kg	0.0097 - 1538	2, 8
Temperature	K	13.8 - 3000	2, 8

Note: The tables for normal and parahydrogen do not reflect any difference for PVT (see Chapter 4 for a more detailed discussion of ortho-para differences).

Uncertainty - The uncertainty is estimated to be

Temperature range	Pressure range	Uncertainty in density, %
700 - 3000 K	0.1 - 100 MPa	1
300 - 700 K	0.1 - 100 MPa	0.5
13 - 300 K	50 - 100 MPa	0.2
13 - 300 K	0.1 - 50 MPa	0.1
Critical region	$T_c \pm 1\%$, $\rho_c \pm 20\%$	6
Solid	34.45 - 70.93 MPa	1

1.2.32. SATURATION PROPERTIES

Definition - The term saturation refers to a state condition where two or more phases coexist in equilibrium.

Tables of Values - Saturation properties of the coexisting liquid and vapor phases are tabulated from the triple point to the critical point in Tables 3 and 9. The individual properties which are tabulated in these tables are listed below along with the subsection in which they are discussed in more detail.

Property	Subsection	Property	Subsection
Temperature	1.2.31	Constant pressure heat capacity	1.2.16
Pressure	1.2.31		
Volume (or density)	1.2.31	Velocity of sound	1.2.33
Internal energy	1.2.22	Surface tension	1.2.35
Enthalpy	1.2.10	Thermal conductivity	1.2.36
Entropy	1.2.11	Viscosity	1.2.39
Constant volume heat capacity	1.2.17	Thermal diffusivity	1.2.9
		Dielectric constant	1.2.6
		Prandtl number	1.2.30

For tables of PVT below the triple point, see Reference 19.

Figure - See pages listed above.

1.2.33. SOUND VELOCITY[4, 7, 8, 19]

Definition - The thermodynamic (isentropic) sound velocity, W, is defined by

$$W^2 = -V\left(\frac{\partial P}{\partial V}\right)_S$$

where P is pressure, V is specific volume, and S is entropy; since entropy is not usually a variable in the mathematical models for the equation of state, calculations are more easily made using

$$W = \left[\frac{C_p}{C_v}\left(\frac{\partial P}{\partial \rho}\right)_T\right]^{1/2}$$

which is thermodynamically equivalent to the above equation. C_p and C_v are the specific heat capacity at constant pressure and constant volume, respectively; P is again pressure, T is temperature, and ρ is the density. Sound velocity can be experimentally measured quite accurately.

Tables of Values -

Units	Range of table		Table location
m/s	13.8 - 3000 K	0.01 - 100 MPA	2, 3, 8, 9
m/s	0 - 12 K (para)	Saturated solid	Reference 19
m/s	4.2 - 13.96 K (normal)	Saturated solid	Reference 19

Figure - 23 and 24

Equation - None

Range of Values -

Units	Triple point		Boiling point		Critical point	RTP
	Liquid	Vapor	Liquid	Vapor		
Para						
m/s	1264	305.7	1089	355	0[a]	1309

[a]Theoretically the velocity of sound should go to 0 at the critical point. Experimentally only very low velocities have been measured in the critical region.

Uncertainty - The uncertainty of the tabulated values has been estimated by comparing tabulated and experimental sound velocities. The uncertainty varies with pressure from 1 to 2% in the liquid and is about 0.5% in the vapor or in the gas above the critical temperature. In the critical region ($T_c \pm 5\%$, $\rho_c \pm 20\%$) the uncertainties are larger but not estimable.

1.2.34. SOUND ABSORPTION[121,122]

Definition - The experimental attenuation α_{exp} is defined by the relation

$$P = P_o e^{-x\alpha_{exp}}$$

where x is the distance between the point where the peak pressure due to the sound wave is P_o and the point where it is P. The so-called "classical" sound absorption α_{cal} is often calculated from:

$$\alpha_{cal} = \frac{2\pi^2}{\gamma W}\left[\frac{4}{3}\eta + \frac{\gamma - 1}{C_p}\lambda\right] f^2/P$$

where γ is the specific heat ratio, $\frac{C_p}{C_v}$, W is velocity of sound, f is frequency, P is pressure, η is the shear viscosity, and λ is the thermal conductivity.

Papers found in the literature report sound absorption in many different ways; some of these are as follows:

$$\alpha_{excess} = \alpha_{exp} - \alpha_{cal}$$

$$\text{nepers} = \ln (P/P_o)$$

$$\alpha_{exp}/\alpha_{cal}$$

$$\alpha_{exp}/f$$

$$\alpha_{exp}\lambda \text{(where } \lambda \text{ is wavelength)}$$

Liquid - α_{exp} for the saturated liquid[121] at 17 $\pm$ 1 K is reported to be 0.11 cm^{-1} $\pm$ 10% for the frequency of 44.4 MHz.

Gas - Values of α_{exp}/f for both normal and parahydrogen at temperatures of 293, 90, and 77 K are given as a function of f/P in Reference 122.

Range of Values -

Temperature	f/P		α_{exp}/f(normal)	α_{exp}/f(para)
K	Hz/Pa	MHz/atm	$(cm \cdot MHz)^{-1}$	$(cm \cdot MHz)^{-1}$
293	14.61	1.48	0.491	
293	15.10	1.53		0.483
77	15.79	1.60		0.677
77	20.73	2.10	0.314	

Uncertainty - The uncertainty of α is 10% for the liquid value and 5% for the gaseous data.

1.2.35. SURFACE TENSION[7,123,124]

Definition - Surface tension is defined as the amount of work required to increase the surface area of a liquid by one unit of area. Note that this property is defined only for liquid in coexistence with the vapor phase.

Tables of Values -

Units	Range of table	Table location
dyne/cm*	13.8 - 32.976 K	3, 9

Figure - 25 and 26

Equation - $\gamma = \gamma_o (1 - T/T_c)^{1.065}$ (see discussion below), where γ is surface tension in dyne/cm, γ_o is 5.328 for parahydrogen and 5.369 for normal hydrogen, and T_c is 32.976 K for parahydrogen and 33.18 K for normal hydrogen.

Range of Values -

Units	Triple point	NBP	Critical point	300 K
Para				
N/m	0.00299	0.00193	0	Not defined
(dyne/cm)	(2.99)	(1.93)	(0)	Not defined
Normal				
N/m	0.003	0.00195	0	Not defined
(dyne/cm)	(3.00)	(1.95)	(0)	Not defined

Discussion - Since Corruccini[123] correlated the older experimental data, a new set of experimental data for normal hydrogen[124] has appeared in the literature. These new data are consistently about 70 x 10^{-6} N/m (0.07 dyne/cm) lower at all temperatures below 31.5 K than those calculated from the above equation. These differences cannot be explained on the basis of differences in temperatures or densities used in the calculations, but the experimental apparatus used by Blagoi and Pashkov[124] does not inspire confidence in their data. The capillary

*(dyne/cm) x 0.001 = N/m.

rise technique was used, which is the most common technique but is beset with difficulties because of the corrections that must be applied. In the older hydrogen surface tension experiments, these corrections amounted to about 10% of the measured capillary rise. Because of the size of the capillaries used by Blagoi and Pashkov[124] the measured capillary rise must be corrected by about 40 to 50%.

Uncertainty - The uncertainty of the tabulated values is estimated to be 1% for temperatures below the normal boiling point and increasing to about 5% for temperatures above 0.8 T_c.

1.2.36. THERMAL CONDUCTIVITY[7,19,125,126]

Definition - The thermal conductivity coefficient relates the transfer of heat through a material via molecular interaction due to a temperature gradient across the material. $q = -\lambda$ grad T, where q is the heat flux (heat per unit area per unit time), grad T is the temperature gradient, and λ is the thermal conductivity coefficient.

Discussion - The literature search revealed no experimental data outside the P-T range of these tabulations. The tabulations include extrapolations to higher densities and temperatures of experimental data by Roder and Diller.[125] An alternative method of calculating thermal conductivity is provided by the modified Enskog theory.[126] The most popular method of correlating thermal conductivity data is to separate the property into a number of additive parts that are temperature and density dependent: $\lambda = \lambda_o(T) + \lambda_E(\rho,T) + \lambda_c(\rho,T)$ where $\lambda_o(T)$ is the dilute gas contribution (a function of T only), $\lambda_E(\rho,T)$ is the so-called excess function, and $\lambda_c(\rho,T)$ gives the enhancement due to the critical point behavior. $\lambda_E(\rho,T)$ and $\lambda_c(\rho,T)$ are taken to be the same

for the para and normal modifications but $\lambda_o(T)$ shows marked differences for the para and normal modifications. A survey of the thermal conductivity of the solid is given in Reference 19.

Tables of Values - 2, 3, 8, and 9.

Units	Range of table		Table location
Para and normal			
mW/cm-K	13.8 - 3000 K	0.01 - 100 MPa	2, 3, 8, 9

Figure - 27 and 28

Equation - None

Range of Values -

	Triple point		Boiling point		Critical	
Units	Liquid	Vapor	Liquid	Vapor	point	RTP
Para						
mW/cm-K	0.7259	0.1243	0.9892	0.1694	∞	1.94
Normal						
mW/cm-K	0.7259	0.1243	0.9892	0.1694	∞	1.87

Uncertainty - The uncertainty of the tabulated data is estimated to be 7% except in the dilute gas--all temperatures and pressures less than 0.101325 MPa (1 atm) --where the uncertainty is estimated at 4% and in the critical region ($T_c \pm 5\%$ and $\rho_c \pm 20\%$) where it is 20%. All data at pressures greater than 35 MPa and at temperatures below 100 K are extrapolated (uncertainty unknown).

1.2.37. THERMODYNAMIC DIAGRAMS[4,7]

Discussion - The thermodynamic diagrams listed below are based on the PVT work of Roder et al.[4] and McCarty and Weber.[7] These diagrams have been prepared very carefully and are accurate to the precision to which they may be read. For other figures the primary consideration in many cases was availability and in others the range of P and T covered by the chart.

Figure - 1, compressibility factor chart for normal hydrogen; 4, temperature-entropy chart (para); 5, temperature-entropy chart (para).

1.2.38. VAPOR PRESSURE[19,104,127]

Definition - The vapor pressure is the pressure, as a function of temperature, of a liquid in equilibrium with its own vapor.

Tables of Values -

Units	Range of table	Table location
Para		
MPa	13.8 - 32.976 K	3
Normal		
MPa	13.95 - 33.180 K	9, 11

Figure - 29 - 32

Equation - Parahydrogen:[104] $\ln(P/P_t) = n_1 x + n_2 x^2 + n_3 x^3 + n_4 (1 - x)^{n_5}$, where $n_1 = 3.05300134164$, $n_2 = 2.80810925813$, $n_3 = -0.655461216567$, $n_4 = 1.59514439374$, $n_5 = 1.5814454428$, $x = (1 - T_t/T)/(1 - T_t/T_c)$, $T_t = 13.8$ K, $T_c = 32.938$ K, and $P_t = 0.007042$ MPa.

Normal hydrogen:[127] Log $P(kg/cm^2)$ = A + B/T + C Log T, where A = -1.55447, B = -31.875, C = 2.39188 and T is in kelvin.

This equation was used to calculate the vapor pressure data given in Table 11 and is restricted to the temperature range of 20.555 to 32.276 K. These data differ slightly from those tabulated in Tables 8 and 9 because the normal hydrogen thermodynamic properties tables were generated using the parahydrogen PVT surface and the ideal gas thermodynamic properties of normal hydrogen. Table 11 data are preferred where accurate normal hydrogen vapor pressures are desired; however, Tables 8 and 9 are internally consistent and sufficiently accurate for all engineering calculations.

1.2.39. VISCOSITY

Dynamic [7,128]

Definition - The viscosity coefficient of a fluid relates the flux of momentum in a fluid to the traceless symmetric part of the velocity gradient: $J = -2\eta D$, where J is the flux of momentum, D is the traceless symmetric part of the velocity gradient, and η is the viscosity coefficient. Note: The coefficient η as defined is sometimes called the shear or dynamic viscosity.

Discussion - The viscosity of a fluid may be separated into two additive parts: $\eta = \eta_o(T) + \eta_E(\rho,T)$, where $\eta_o(T)$ is the dilute gas contribution and is a function of temperature only and $\eta_E(\rho,T)$ is called the "excess" viscosity and is a strong function of density. When compared on a density basis, there does not seem to be a significant dependence on ortho-para composition.

Tables of Values -

Units	Range of table		Table location
kg/m-s	13.8 - 3000 K	0.01 - 100 MPa	2, 8
kg/m-s	Saturation		3, 9

Figure - 33

Equation - Equations are presented in Reference 519.

Range of Values -

	Triple point		Boiling point		Critical	
Units	**Liquid**	**Vapor**	**Liquid**	**Vapor**	**point**	**RTP**
Para and Normal						
kg/m-s	255.1×10^{-7}	7.36×10^{-7}	132.0×10^{-7}	11.28×10^{-7}	35.43×10^{-7}	89.48×10^{-7}

Uncertainty - The uncertainty of the tabulations is estimated to be 5% except in the dilute gas--all temperatures and pressures less than 0.101325 MPa (1 atm) --where the uncertainty is estimated at 3% and in the critical region ($T_c \pm 5\%$ and $\rho_c \pm 20\%$) where it is 10%. All data at pressures greater than 35 MPa and at

temperatures below 200 K are extrapolated (uncertainty unknown). The dotted lines on Figure 33 represent a graphical smoothing of two algebraic functions that represent high and low temperature experimental data and are extrapolated to join in this temperature region.

Bulk

The shear viscosity should not be confused with the bulk viscosity. The bulk viscosity relates the flow of momentum in a fluid to the divergence of the velocity: $J = 2\eta D - \eta_v I \text{div } u$, where I is the unit tensor, div u is the divergence of the velocity of the fluid, and η_v the coefficient of bulk viscosity.

Kinematic

Definition - The kinematic viscosity, γ, is defined as $\gamma = \eta/\rho$, where η is the shear viscosity and ρ is the density.

1.2.40. FREE ENERGY[4,7]

Definition - The Gibbs free energy, G, is defined as G = H - TS, where H is enthalpy, T is absolute temperature, and S is entropy. Similarly, the Helmholtz free energy, F, is F = U - TS, where U is internal energy.

Tables of Values - These quantities are not tabulated but may be simply obtained, using the formula above, from the following tables.

Units	Range of table		Table location
J/g	13.8 - 3000 K	0.01 - 100 MPa	2, 8
J/g	Saturation boundary		3, 9

Figure - None

Equation - None

Range of Values - (Gibbs free energy)

Units	Triple point		Boiling point		Critical point	RTP
	Liquid	Vapor	Liquid	Vapor		
Para						
J/g	-377	-377	-420	-420	-542	-15,233
Normal						
J/g	-21.9	17.0	-66.5	-80.3	-138	-16,945

Uncertainty - The uncertainty varies from about 0.5 J/g in the low density limit to about 15 J/g in the liquid.

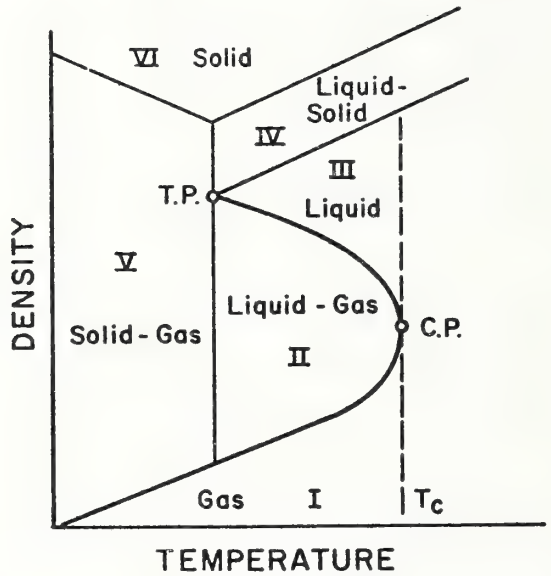
CHAPTER TWO

THERMOPHYSICAL PROPERTIES OF HYDROGEN IN THE SOLID, SOLID-GAS, AND SOLID-LIQUID STATES

Hans M. Roder

2.1. INTRODUCTION

This chapter is quite similar to Chapter 1 except that the properties covered pertain to the solid phase. Definitions for nearly all properties are found in Chapter 1. We include the single phase compressed solid state as well as the solid-vapor and solid-liquid two phase regions, i.e., phases IV, V, and VI shown in the schematic density-temperature phase diagram below.



Ordinarily data are not measured in the coexisting regions solid-liquid, or solid-gas, rather they are established from the phase boundaries in terms of a variable called quality. The phase boundaries are included in the description of the adjacent single phase region.

This chapter is based on an earlier survey[19] done by the National Bureau of Standards for the Lawrence Livermore Laboratory, which covered a wide range of properties including PVT, thermodynamic, thermal, transport, electrical, radiative, and mechanical. Only the ortho-para modifications of hydrogen have been included here. For properties of the other isotopes of hydrogen the reader should consult Reference 19 or the successor surveys prepared by the Lawrence Livermore Laboratory, Reference 139. A second more recent review has

been given by Silvera[140], while the Russian work has been summarized in a volume edited by Rabinovich.[141] Temperatures are limited to those below the critical point, i.e., below 33 K. The pressure range is not restricted, however, very little data exist at pressures other than saturation.

The literature surveyed includes all references available to the Cryogenic Data Center through March of 1973, some 1500 items. A literature search covering 1973 to March 1978 disclosed an additional 310 references. Some of these references have been included in this chapter, particularly if they contained firm data. The evaluation of these references was, however, only cursory, i.e., coverage to March of 1978 is not claimed.

In selecting sources of data, a critical evaluation was not made, however, the following guide was used:

a) If several sets of data exist, which, in our judgment, are the "best data?"

b) Are these values consistent with other properties presented?

c) Are tables or graphs available? Are they in a convenient form?

d) Can we find any values at all - even if estimated?

Many inconsistencies or discontinuities exist in the data presented because the values originate from many diverse sources. Considerable effort would be required to reconcile the discrepancies between different sources. It is best that the user be forewarned; therefore, we list a few of the discrepancies which are most vexing.

First, of course, is the matter of temperature scales. The NBS-39 scale, the NBS-55 scale, and more recently the IPTS-68 scale have been in common use, and their interrelation is fairly well understood. For example, the triple point temperatures are 13.803 K, on the NBS-55 scale, 13.813 K on the NBS-39 scale, and 13.810 K on the IPTS-68 scale. The values differ by 0.01 K. Next

is the matter of pressure at the triple point. Vapor pressure equations for solid and liquid as well as the melting curve should intersect mathematically at the triple point, yet they rarely do. Finally, different authors choose different reference states for entropy and enthalpy. For example, the reference enthalpy, $H_o - E_o^\circ$, is zero for the ideal gas at 0.101325 MPa (1 atm) and 0 K for the upper part of Table 12, while the reference enthalpy is zero for the ideal crystal at 0 K for the lower part. The enthalpies of the solid at 10 K compare as follows: -753.7 J/mol and 6.2 J/mol (1.479 cal/mol in Table 12).

Computer Programs

A significant portion of the tables and figures presented in this chapter were prepared with the aid of computer programs. Both the slush hydrogen program[142] and the equation of state[105] for liquid and vapor were developed by NBS for Johnson Space Center of the NASA. The programs are integrated in a way which avoids all of the inconsistencies mentioned above. They are available from the NBS Thermophysical Properties Division, Boulder, CO 80303.

2.2. DISCUSSION OF THE PROPERTIES

2.2.1. CRYSTAL STRUCTURE[143-161]

Discussion - Hydrogen is an extremely interesting solid because for certain isotopic compositions it may undergo a transition at low temperatures. This transition has been studied by X-ray diffraction, electron diffraction, neutron diffraction, NMR[143], and infrared absorption.[144] In general all hydrogen isotopes solidify in the hexagonal close packed (hcp) structure, particularly if cooled from the liquid state. Parahydrogen appears to be stable in hcp down to the lowest temperatures investigated. In constrast,

hydrogen rich in the ortho component (> 60%) undergoes a transition to the face centered cubic (fcc) structure in the temperature range 1.2 to 4.2 K. In addition, there is considerable evidence that unconverted hydrogen if condensed from the vapor in thin films is in fcc form.[145] Other experiments show that the substrate can affect the lattice spacing, introducing the fcc structure, and that plastic deformation initiates the fcc structure.[146]

The transition temperature is a function of ortho-para concentration[148] as well as density or pressure.[149] The volume change of the transition is small, 1.3%, but has been measured.[147] The transition corresponds to the λ anomaly in the specific heat but exhibits considerable hysteresis. It is obvious that the difference in energy of the two close packed structures of hydrogen is exceptionally small. It is also well known that solid phases frequently undercool and remain in a metastable form; thus hysteresis is often encountered in such a martensitic transformation.[146] A different explanation is that the changes in thermodynamic properties are due mainly to the order-disorder transition of the rotational motions, and not to the crystalline phase change.[150]

Parahydrogen exhibits a second phase transition in the compressed solid close to the melting line. This transition was predicted[151], its volume change has been measured[153,154] to be 0.15%, the singularity in the melting line has been measured,[157] and the structure of the new solid has been determined to be fcc.[155,156]

Studies[152] of the Raman spectra initially were interpreted to show a fcc structure at pressures of around 100 MPa (1 kbar) at temperatures near 4 K. In subsequent studies[158] the authors were unable to confirm their earlier report. A short paper by Mills[159] attempts to connect these transitions. The controversy is far from being settled because in a most recent paper

Silvera, et al.[160] attribute this phase to an instrumentation effect rather than a true transition. The discrepancies in the various diagrams are shown clearly in Figures 34a, b, and c where 34a is based on the measurements of Dwyer et al.[161] as interpreted in References 19, 142, and 151, while 34b is taken from Reference 159, and 34c from Reference 160.

Figure - 34a, b, c

Range of Values - see lattice parameters, Subsection 2.2.15

2.2.2. DIELECTRIC CONSTANT[12,14,16,18,19,162-164]

Discussion - It is important for the user to realize that correlation or analysis of the dielectric constant is almost always handled through the Clausius-Mossotti relation $M(\varepsilon-1)/(\varepsilon+2)\rho = P$, or solved for $\varepsilon = (1 + 2P\rho)/(1 - P\rho)$, where ε is the dielectric constant, M the molecular weight, ρ the density, and P the molar polarizability. Polarizability is most often expressed in cm^3/g; a nominal value for parahydrogen is 1.004 cm^3/g. However, to compare polarizabilities of hydrogen isotopes it is best if P is expressed in molar units, thus the nominal value for parahydrogen becomes 2.02 cm^3/mol.

Parahydrogen

The most extensive measurements have been made on parahydrogen. A composite plot of the results, Figure 35 shows that the polarizability is a very slowly varying function of density. Stewart[18] is able to correlate his entire set of measurements with a single equation (see Subsection 1.2.6). Younglove's[14] measurements extend to higher liquid densities and include values for the solid. He represents his solid measurements by the equation $P = 1.011 - 0.049091\rho$ where P is in cm^3/g and ρ in g/cm^3. As shown in Figure 35, Younglove reports a difference of about 0.5% in P between liquid and

solid. This value has recently been called to question by Udovidchenko and Manzhelii[16] and by Wallace and Meyer[162,163] who report a change of no more than 0.2%. The difference may be explained by the fcc solid phase near the melting line (see Subsection 2.2.1).

Since the dielectric constant is proportional to density, a plot of ε vs. T is very similar to a density-temperature phase diagram. For parahydrogen, liquid and solid boundaries are shown in Figure 36.

Normal Hydrogen

To estimate values of the dielectric constant for normal hydrogen, we use the results of Kogan and Milenko[12] who measured the difference in dielectric constant for various concentrations of ortho-parahydrogen in the liquid state. As recalculated[19] the difference is:

molar polarizabilities, cm^3/mol				difference	conditions
$n\text{-}H_2$	2.0372	$p\text{-}H_2$	2.0279	0.0093	saturated liquid

More recent measurements of the normal-para difference in the solid state have been reported by Haase and Meyer.[164] The dielectric constant for normal hydrogen is then estimated using the following steps:

a. find density or state at point desired (mol/cm^3)

b. calculate polarizability of $p\text{-}H_2$ at an equivalent density (mol/cm^3)

c. adjust polarizability by the difference (0.0093)

d. calculate desired dielectric constant

The measurements reported in Reference 165 are probably not valid because the measured dielectric constant should increase as the temperature is lowered. The measurements on solid hydrogen in Reference 166 are probably not valid because the experimenters did not succeed in filling the cell completely.

Figures - 35, 36

Equation - see discussion for equation of solid

Uncertainty - the uncertainty in the molar polarizability of the solid can be as large as 0.3%.

2.2.3. ENTHALPY[129,142,161,167-169]

Discussion - The coverage for parahydrogen is nearly complete. It is the only isomer for which values in the compressed solid can be obtained, primarily because the specific heats were measured by Ahlers.[169] Enthalpy estimates for the compressed solid are presented in Table 14. This table was assembled from the reports of Dwyer and Cook.[161,167,168]

Tables of Values - parahydrogen, solid-vapor two phase region, Table 12; parahydrogen, solid-liquid two phase region, Table 13; single phase compressed solid, Table 14

Figure - 43, T-S chart

Uncertainty - as estimated in Reference 142

enthalpy: 1.2 J/mol for solid-liquid;
1.5 J/mol for solid-vapor

2.2.4. ENTROPY[129,142]

Tables of Values - parahydrogen, solid-vapor two phase region, Table 12; parahydrogen, solid-liquid two phase region, Table 13

Figure - 43, T-S chart

Uncertainty - as estimated in Reference 142

entropy: 0.08 J/mol-K for solid-liquid;
0.146 J/mol-K for solid vapor

2.2.5. EQUATION OF STATE[104,105,129,142,169-173]

Equations - In the correlation by Mullins, et al.[129] a virial representation of the gaseous PVT surface is extrapolated to temperatures below the triple point. The correlation of the solid-vapor and solid-liquid two phase regions[142] is achieved by having a specific 33 term MBWR equation of state[104,105] supply all properties for the saturated vapor below the triple point as well as all properties on the liquid side of the melting curve. While the two correlations are reasonably consistent, discontinuities between them exist as shown in Table 12. Whatever equation of state is used for the liquid PVT surface, care must be exercised for densities near the melting line, or the equations will fail to correctly predict the specific heats.[173] The equation of state for the solid has been described on theoretical grounds by Anderson, et al.[172]

For the compressed solid a review which includes the so-called "metallic hydrogen" is given by Douglas and Beckett.[170] Numerous equations of state are presented, most of which are based on some kind of intermolecular potential. Ahlers[169] calculates some of the derived properties such as compressibility from the Grüneisen equation. The equation proposed by Burshtein and Rabinovich[171] while "anchored" with experimental densities along the solid melting line is not satisfactory because it does not yield the proper densities of the solid under its own vapor pressure. None of these equations of state account for the phase change near the melting line of the solid. Therefore, a unique equation of state from which one could calculate the PVT properties at an arbitrary point in the solid does not exist; however a paper that gives an equation of state for the compressed solid without the phase change and is based on a large number of PVT measurements is in preparation.[160]

2.2.6. FIXED POINTS[105,142]

Discussion - See also Subsection 1.2.15. We note here values for the triple point used in the most recent correlation for parahydrogen[142] which differ very slightly from those selected in Subsection 1.2.15 because the underlying equation of state[105] is slightly different. In addition, so called values of V_o, i.e., the molar volume of saturated solid hydrogen at the helium boiling point (4.2 K) is of interest for work in X-ray or neutron diffraction. The most consistent and recent correlation of these values is given by Silvera et al.[160]

Triple Point

$T = 13.800$ K

$P = 0.0070420875$ MPa (0.0695 atm)

ρ(solid) = 86.51 kg/m^3 (42.91 mol/L)

ρ(liquid) = 77.04 kg/m^3 (38.21 mol/L)

ρ(vapor) = 0.1258 kg/m^3 (0.06238 mol/L)

V_o(solid) = 23.14 $\pm$ 0.08 cm^3/mol at 4.2 K

2.2.7. SPECIFIC HEAT (HEAT CAPACITY) AT CONSTANT PRESSURE[161,169]

Discussion - See also Subsection 2.2.9. Experimental values for this property have not been measured. Values for C_p in the compressed solid states were estimated by Dwyer and Cook[161] from the C_v measurements of Ahlers.[169] Ahlers estimated values of C_p at the saturated solid boundary from his single phase C_v measurements.

Tables of Values - C_p on the saturated solid boundary, Table 12; C_p in compressed solid states, Table 14

Figure - 37

Uncertainty - About 2% at 4 K rising to around 5% at the triple point.

2.2.8. SPECIFIC HEAT (HEAT CAPACITY) AT CONSTANT VOLUME[169,174]

Discussion - See also Subsection 2.2.9. Experimental values for this property have been measured in the single phase compressed solid by Ahlers[169] and by Roberts and Daunt.[174]

Tables of Values - Table 14

Uncertainty - About 2% at 4 K rising to around 5% at the triple point.

2.2.9. SPECIFIC HEAT (HEAT CAPACITY) OF THE SATURATED SOLID[142,161,169,174-178]

Discussion - We distinguish between heat capacity at saturation (C_σ), heat capacity at constant pressure (C_p), and heat capacity at constant volume (C_v). The property most commonly measured is C_σ, where for the isotopes having ortho-para isomers a large dependence of specific heat on composition is found in the solid.

A composite picture for the heat capacity of the solid (C_σ) is shown in Figure 38. Values for parahydrogen are given in Table 12; they are based on values taken from Ahlers.[169] Values for other ortho-para compositions are primarily from the paper by Hill and Ricketson.[175] Shown, but not in any detail is the λ-transition near 2 K, the best description of which is given by Ahlers and Orttung.[177,178] Ahlers[169] also measured the specific heat C_v for three molar volumes of parahydrogen in compressed solid states. The values are given in Table 14; they were converted to estimated values of C_p by Dwyer and Cook.[161] The estimated values of C_p are presented in Figure 37. More recent measurements by Roberts and Daunt[174] are in very good agreement with those of Ahlers.[169] Heat capacities at low ortho concentrations and very low temperatures were examined by Popov, et al.[176]

The general features of the property for hydrogen are as follows: Below about 14 K the heat capacity (C_σ) of the solid shows a broad anomaly for

compositions between para and normal; with increasing ortho concentration in this temperature range the heat capacity increases; for ortho concentrations larger than 60%, a λ transition exists at low temperatures ($\sim$ 1.3 to 4.2 K). The values of C_σ are commonly taken to be the same as C_p; the values of C_v are lower than C_σ at all temperatures but the difference is negligible below 5 K; a significant difference exists between C_σ of the solid and the liquid.

Tables of Values - Table 12

Figure - 38

Equation - The representation of Ahlers' values[169] as given in Reference 142 is : $C_\sigma = -101. + 87.75\ T - 26.95833333\ T^2 + 4.25\ T^3 - 0.041666667\ T^4$ with C_σ in mJ/mol and T in K for T ranging from 3 K to the triple point.

Uncertainty - About 2% at 4 K rising to around 5% at the triple point.

2.2.10. HEATS OF TRANSITION

Definition - A heat of transition is the energy associated with a phase change. Besides the solid-liquid and liquid-gas transition, hydrogen has two known solid-solid transitions, (see Subsections 2.2.1 and 2.2.15). The energy changes due to these solid transitions are not known but are thought to be small. For values of the latent heats of fusion, sublimation and vaporization, see Subsections 2.2.13, 2.2.14 and 1.2.25.

2.2.11. INTERNAL ENERGY[142]

Tables of Values - parahydrogen, solid-vapor two phase region, Table 12; parahydrogen, solid-liquid two phase region, Table 13

Uncertainty - as estimated in Reference 142.

Internal energy: 1.2 J/mol for solid-liquid;
1.5 J/mol for solid-vapor

2.2.12. ISOTHERMAL COMPRESSIBILITY[16,179-181]

Tables of Values - Table 15 and Table 22

2.2.13. LATENT HEAT OF FUSION[19,110,116,117,142,169,182,183]

Definition - The latent heat of fusion is the amount of heat required to melt a unit mass of a substance at constant temperature and pressure at temperatures at the triple point and above.

Discussion - The latent heats of fusion are summarized in Table 16. Most of the experimental work was conducted at essentially triple point temperatures; however, some measurements have been made at elevated pressures, and others as a function of ortho-para composition. If the authors indicated the triple point temperature in the paper, then the value of that temperature is given in brackets in the temperature column. For the measurements at elevated pressures, both the temperature and the pressure at which the measurements were made are shown. In the heat of fusion column the values which are underlined are the ones which are given in Subsection 1.2.15 in the fixed point tables. The value selected in the correlation[142] is 117.277 J/mol for the heat of fusion at the triple point, partially to remain consistent with the earlier thermodynamic calculations, and partially because this value is quite close to the average of all experimental determinations (see Table 16).

Tables of Values - Table 16

Figure - None

Equation - The heats of fusion at elevated pressures were determined experimentally by Dwyer, et al.[117] The authors represent the experimental

results by a straight line in pressure. Using the value selected above (117.277 J/mol) the equation used in Reference 142 for the heats of fusion becomes:

$$\Delta H_{fusion} = (28.02693164 + 0.044149P) \cdot 4.184$$

where ΔH_{fusion} is in J/mol and P is in atm.

Range of Values -

Units	Triple point	15.54 K	21.19 K
J/g	58.17	63.92	83.60
(cal/mol)	(28.03)	(30.80)	(40.28)

Note: Values are for parahydrogen.

Uncertainty - The estimate of uncertainty based on the existing data is about 0.52 J/g, or around 1%.

2.2.14. LATENT HEAT OF SUBLIMATION[19,129,130,142,184,185]

Definition - The latent heat of sublimation is the amount of heat per unit mass required to vaporize the solid phase.

Discussion - The latent heat of sublimation like the heat of vaporization is temperature dependent. Experimental measurements of the latent heat of sublimation are rare.[185] The property is usually calculated from the Clausius-Clapeyron equation requiring values of the solid volumes, the vapor volumes, and the temperature derivative of the vapor pressure curve. The difficulty is to select a proper equation of state for the vapor, because the vapor volumes predominate in the calculation. For temperatures involved, the extrapolation of the virial coefficient B(T) is quite extended, therefore the ideal gas equation is often used for the vapor volumes. At the triple point the latent heat of sublimation should equal the sum of the latent heat of vaporization

and the latent heat of fusion. The equality offers a severe test of thermodynamic consistency, in particular, of the various vapor pressure derivatives used in the calculations.

The heat of sublimation at 0 K is of particular interest theoretically, and a number of papers are concerned with this extrapolation. Clusius[130] calculated a value of 380.6 J/g (183.4 cal/mol) for hydrogen, while Eyring, et al.[184] have calculated values of 376.8 J/g (181.56 cal/mol) for parahydrogen and 379.6 J/g (182.92 cal/mol) for normal hydrogen.

Thermodynamically consistent calculations on parahydrogen are given by Mullins. et al.[129] and by Roder.[142]

Tables of Values - This quantity is tabulated in Table 12

Figure - None

Equation - None

Range of Values

Units	0 K	Triple point
Para		
J/g	376.7	507.4
(cal/mol)	(181.5)	(244.5)
Normal		
J/g	379.6	--
(cal/mol)	(182.9)	--

Uncertainty - The uncertainty is estimated to range from 6.9 J/g at 3 K to about 4 J/g at the triple point.

2.2.15. LATTICE PARAMETERS[146,155,186-190]

Discussion - The ranges of the lattice parameters have been assembled from various sources into Table 17. It should be emphasized, though, that the references given in the table are not exhaustive, only representative.

Lattice parameters combined with crystal structure are very often the only way in which molar volumes for the solid can be obtained.

Tables of Values - Table 17

Uncertainty - The accuracy in the determination of lattice parameters from X-ray diffraction is seldom better than about 1%.

2.2.16. MECHANICAL PROPERTIES[169,174,191-201]

Discussion - In other sections values for several mechanical properties such as the velocity of sound of the solid (Subsection 2.2.25) and thermal expansion of the solid (Subsection 2.2.28) are presented. In this Subsection the remainder of the mechanical properties of the solid phase are discussed.

Experimental measurements of uniaxial loading have been conducted by Bolshutkin, Stetsenko and their co-workers on polycrystalline parahydrogen[195] and on polycrystalline normal hydrogen.[192] In these papers the authors present values of Young's modulus, shear modulus, tensile strength, nominal yield stress, and relative elongation. Values for normal and parahydrogen are summarized in Figure 39 which is taken from Reference 192.

Experimental measurements of the velocity of sound in solid hydrogen[196,197] yield calculated values of Poisson's ratio as well as values of adiabatic and isothermal compressibilities. These values are found in Table 24. In addition, the papers report values of the Debye θ, elastic constants, and the adiabatic bulk modulus, all of which together with a few calorimetric Debye θ's are given in Table 18. Note that the calorimetric Debye θ's are consistent, and the mechanical Debye θ's are consistent, but that the results of the two methods differ considerably as pointed out in Reference 196. The explanation that "This decrepancy is due to incorrect elimination of the anomalies in the temperature dependence of C_v ..." needs further study,

particularly as the recent results on C_v of Roberts and Daunt[174] are in excellent agreement with those of Ahlers.[169] Ahlers' measurements are at constant volume; technically the correct way to determine a Debye θ is from C_v data. In addition, Ahlers' θ's vary from 128 to 106 for his lowest isochore, that is for temperatures from 0 to 15 K, and they vary considerably more for changes in density.

Finally there are measurements of shear strength as a function of applied pressure. Initial values of extrusion pressures were reported by Stewart.[194] These measurements have since been refined by Towle[191] and Bignell.[193] Towle's values are given in Table 19. Plastic deformation is discussed by Bol'shutkin and Coworkers.[198,199] Deformation curves for hydrogen are given in Reference 199, and a graph of creep is given in Reference 201. Calculation of elastic constants using several different experiments were made by Goldman.[200]

Tables of Values - Debye θ, adiabatic bulk modulus, elastic constants - Table 18; shear strength - Table 19; Poisson's Ratio, adiabatic and isothermal compressibilities - Table 24

Figure - Young's modulus, shear modulus, tensile strength, nominal yield stress, relative elongation - Figure 39

2.2.17. MELTING CURVE[105,120,142]

Discussion - See also Subsections 2.2.5 Equation of State and 2.2.21 PVT. In the most recent correlation[142] the properties on the liquid side of the melting curve are supplied by a specific equation of state[105] and its intersection with the melting pressure equation[120] as given in Subsection 2.2.18.

Tables of Values - Table 13

Figures - 17, 18

2.2.18. MELTING PRESSURE[14,110,119,120,142,202]

Discussion - Parahydrogen: The equation used is the one developed by Goodwin,[120] except that the temperature scale has to be shifted by 0.003 K to match the triple point temperature and pressure of the liquid vapor pressure curve used with the 33-term MBWR equation. The shift insures that the melting pressure equation and the liquid vapor pressure equation intersect at the triple point, 13.800 K and 0.00704 MPa (0.0695 atm), which are the values chosen for the basic 33-term equation of state. Additional experimental values for the melting pressures of parahydrogen have been published by Younglove[14] and by Kechin et al.[202]; these values have not yet been incorporated into a melting pressure analysis.

Normal hydrogen: The equation used is the one developed by Goodwin[120] which is based upon the experimental results quoted by Woolley, et al.[110] and Mills and Grilly.[119]

Tables of Values - Parahydrogen, Table 13; normal hydrogen, Table 20

Figures - 17, 18

Equation -

$$(P - P_t)/(T - T_t) = [A \exp(-\alpha/T)] + BT$$

where A = 30.3312 atm/K, α = 5.693 K, B = 2/3 atm/K^2, and values of the triple point parameters are as follows:

	$p\text{-}H_2$	$n\text{-}H_2$
T_t, K	13.803	13.947
P_t, MPa	0.00704	0.00719
(atm)	(0.0695)	(0.071)

For parahydrogen in Reference 142 the Kelvin temperature shift is T(shifted) = T + 0.003.

Uncertainty - The uncertainty of the melting pressures is about 0.1%.

2.2.19. ORTHO-PARA MODIFICATIONS[203-206]

Discussion - See also Subsection 4.2.6.

The user should be aware that temperature dependent ortho-para changes continue to influence properties in the solid state. Several properties such as specific heat (Subsection 2.2.9), thermal conductivity (Subsection 2.2.26), and thermal diffusivity (Subsection 2.2.27) are highly sensitive to actual ortho-para composition.

For solid hydrogen Ahlers[203] made measurements of the ortho-para conversion as a function of the molar volume of the solid. These measurements are in excellent agreement with the experimental values obtained at very low pressure by Cremer.[204] More recent measurements have been reported by Schmidt[205] and calculations have been performed by Milenko and Sibileva.[206]

2.2.20. PHASE DIAGRAM[207]

Definition - Phase diagrams indicate the boundaries between the solid, liquid, and gas phases. A schematic phase diagram was used in the introduction, Section 2.1. The different phases are quite often shown in the diagrams of other properties, even though it may not be possible to obtain the PVT of the point in question. As a guide to the user all such diagrams are indicated below. A phase diagram which includes metallic hydrogen is given in Reference 207.

Figure coordinates	Figure number
Pressure-temperature	34a,b,c
Dielectric constant-temperature	36
Molar volume-temperature	40a,b
Temperature-entropy	43
Vapor pressure-temperature	44

Uncertainty - The uncertainty of values taken from the above (or any other) diagrams is determined by the resolution of the individual chart.

2.2.21. PVT[4,14,16,19,110,118-120,129,142,151,153,154,158-161,169,179-181,208-211]

Discussion - As indicated in the introduction, we distinguish three separate regions, the solid-vapor and solid-liquid two phase regimes and the single phase compressed solid states. Experimental data for the two phase regions include vapor pressures,[110,208,209] melting pressures,[14,119,120] saturated solid densities,[110,169,179] liquid densities along the melting line,[4,118] and volume changes on fusion.[210] Saturated solid densities are also obtained from the crystal structure, Subsection 2.2.1, and the lattice parameters, Subsection 2.2.15. The data for the solid-vapor region have been correlated by Mullins, et al.,[129] while the data for parahydrogen in both two phase regimes have been correlated more recently.[142] Data for the single phase compressed solid[16,118,153,154,158,161,169,180,181,211] largely remain uncorrelated. An exception is the PVT measurements by Silvera et al.[160] These authors ascribe the phase transition near the melting line to an instrumentation effect rather than a true transition. The diagrams illustrate that the controversy is far from settled. Figure 40a is based on the measurements of Dwyer et al.[161] as adjusted in References 19, 142, 151 and shows two phase change points on the melting line. Figure 40b is taken from Mills[159] and features only one phase change point along the melting line. In comparison, figure 34c taken from Reference 160 shows no phase change along the melting line.

Separate tables for normal hydrogen illustrate differences in PVT. The differences, however, are very slight and can be neglected for most practical applications.

Tables of Values - parahydrogen, solid-vapor two phase region, Table 12; parahydrogen, solid-liquid two phase region, Table 13; normal hydrogen, Tables 20, 22, 23, 27; single phase compressed solid, Tables 14, 21, 22

Figures - 34c, 40a,b, 41, 43

Uncertainties - as estimated in Reference 142

temperature	0.01 K
pressure	1% at the triple point increasing to 200% at very low temperatures. Negligible for pressures above 0.101325 MPa (1 atm).
density	0.2% at temperatures above triple point. 0.4% at the triple point increasing to 1.5% at 4 K.

2.2.22. SATURATION PROPERTIES

Discussion - the reader is referred to the various subsections on the specific property desired.

Tables of Values - solid-vapor two phase region, Tables 12, 25 (solid only); solid-liquid two phase region, Table 13

Properties covered in Tables 12 and 13

pressure, temperature, volume, density, enthalpy, entropy, internal energy, heat capacity at saturation, heat capacity at constant pressure, heat of sublimation, heat of fusion

Properties covered in Table 25

temperature, density, heat capacity at saturation, thermal conductivity, thermal diffusivity

Figures - 36, dielectric constant
38, heat capacity at saturation
40a,b, PVT
43, thermodynamic functions
44, vapor pressure

2.2.23. SLUSH HYDROGEN PROPERTIES[105,142]

Discussion - See also Subsection 4.2.9.

Slush is the term used to designate a mixture of solid and liquid phases of the gas under consideration. There are two major reasons for the current interest in slush. First, since solid is more dense than liquid, slush offers a way to carry a larger quantity of the cryogen in a container of fixed volume, as compared to the liquid alone. Second, as the solid melts, absorbing heat, slush offers a way to lengthen the time that the cryogen can be stored in a fixed volume container before venting has to occur.

In Reference 142, the solid-liquid and the solid-vapor two phase regions are treated. The solid-vapor region is included because slush is currently produced by a freeze-thaw process. This means the properties of the vapor at temperatures just below the triple point are also of concern. Further, the properties of this two phase region are of interest in other applications, such as subliming refrigerators, which are used to cool infrared detectors, and in making solid hydrogen targets for fusion experiments.

Computer Program Description - The thermodynamic properties of hydrogen can be obtained from the computer program described in Reference 142 for temperatures both below and above the triple point. Values of the various physical properties required for the computations are either taken from the literature, or are extrapolated. If extrapolated, the extrapolations are based on the known behavior of other simple fluids. Inputs to the program are temperature and quality. The properties returned include pressure, density, enthalpy, entropy and internal energy. The present programs for slush hydrogen are an extension of and dependent upon the equations of state developed previously for these gases.[105]

Program Name	P-T Range	List of Properties	Accuracy	Availability	Continuous	Modifications	Input
SLH2*	0-35 MPa	T,Q,TP,P, O,H,S,U	0.1-1%	NBS Cryogenic Data Center	Yes	Para	T,Q,TP

*Basic Equation of State H2PROPS is also required.

Comments - The program (by shifting, adjusting, or constraining) avoids the vexing problem of inconsistencies in data which originate from many diverse sources. The quality, Q, used for both solid-vapor and solid-liquid regimes is defined in analogy to the more familiar quality used in liquid-vapor problems. The triple point key, TP, is used to specify either solid-vapor or solid-liquid regimes for the case in which the temperature, T, is exactly equal to the triple point. The program has been used to calculate the major tables of this chapter, i.e., Tables 12 and 13 as well as the values used to plot Figure 43.

2.2.24. SOLID TRANSITIONS

Discussion - See also Subsections 2.2.1 and 2.2.15.

Solid transitions are known to occur for hydrogen. One transition is dependent on ortho-para compositions and involves a change in structure from hcp to fcc. Typical transition temperatures range from 1.2 to 4 K. A second transition also involves a change in structure from hcp to fcc. It occurs for a limited range of elevated pressures along the melting line.

2.2.25. SOUND VELOCITY[196,197,212-215]

Discussion - The velocity of sound has been measured by a number of authors. Bezuglyi and Minyafaev measured the longitudinal and transverse velocity of sound in polycrystalline normal hydrogen.[212] Bezuglyi, et al.[196] made similar measurements on parahydrogen. Their results are reproduced in Table 24. The transverse velocities agree very well with later measurements on single crystal hydrogen and deuterium made by Wanner and Meyer.[197,213-215] The longitudinal velocities, however, differ by about 10%. These measurements were made in the compressed solid states but have not been correlated with the available PVT data to any extent.

Tables of Values - Table 24

Uncertainty - For polycrystalline samples about 5%; for the longitudinal velocity in single crystals up to 10%.

2.2.26. THERMAL CONDUCTIVITY[216-221]

Discussion - The thermal conductivity of solid hydrogen, similar to the heat capacity, is highly dependent on ortho-para composition. It also depends on crystal quality, and should depend on density for the compressed solid states. However, most of the experimental measurements have been made at or near saturation pressure. Experimental measurements on hydrogen have been conducted by Hill and Schneidmesser[216,217], Dwyer, et al.,[218] and Bohn and Mate.[219]

Thermal conductivity of solids is usually analyzed in terms of the thermal resistance $W = 1/k$. The intrinsic resistance, W_i, that is phonon-phonon scattering, follows a T^n dependence for nonmetals where n ranges from 1 to 3. For parahydrogen, the value of n is between 3 and 4 if estimated

from the results of Hill and Schneidmesser for temperatures between 4 and 11 K. The results of Dwyer, et al.[218] are in apparent disagreement with this temperature dependence; they are too low in W (too high in k). The disagreement probably occurs because the measurements were taken along the melting curve at elevated pressures, i.e., the densities are higher than those prevailing at the triple point. Solid heat transfer studies were made by Contreras and Lee.[220] Experimental results on deuterium are contrasted to hydrogen in Reference 221.

Figure - 42

Uncertainty - We note that the hydrogen results of Hill and Schneidmesser (1% ortho) and those of Bohn and Mate (1.1% ortho) differ by almost an order of magnitude. This uncertainty should decrease to about 3% as the temperature approaches the triple point.

2.2.27. THERMAL DIFFUSIVITY

Discussion - Values of thermal diffusivity have been calculated from values given in other subsections, thermal conductivity (Subsection 2.2.26), density (Subsection 2.2.21), and C_p (Subsection 2.2.7). Applicable property values and calculated thermal diffusivities are shown for solid para and normal hydrogen in Table 25.

Tables of Values - Table 25

Uncertainty - The uncertainty in thermal diffusivity near the triple point is about 3% as obtained from the errors in the other variables. Since the solid thermal conductivity is very sensitive to ortho-para content, the value of thermal diffusivity of parahydrogen near 4 K has to be considered uncertain by one order of magnitude. Note that values of thermal diffusivity for para and normal hydrogen differ by several orders of magnitude for the lower temperatures of the solid.

2.2.28. THERMAL EXPANSION[169,222]

Discussion - Explicit values for any of the hydrogens were not found in the literature. We can, however, estimate the thermal expansion from the volume change. In the absence of preferred orientation the linear expansion is to a very good approximation one-third of the volume expansion. Solid parahydrogen contracts by about 1% in contrast to a typical metal which contracts very little if at all in the same temperature range. Calculated values of the thermal expansion coefficient for solid parahydrogen were taken from Ahlers.[169] A more recent paper by Udovidchenko, et al.[222] covers thermal expansion at a pressure of 0.4053 MPa (4 atm) in the solid, i.e., at pressures below the fcc form.

Table of Values - Table 26

Uncertainty - Since the molar volume of the solid is uncertain by about 1.5%, the uncertainty in thermal expansion is at least that large.

2.2.29. THERMODYNAMIC DIAGRAMS[129,142,223]

Discussion - Thermodynamic diagrams or Mollier charts are used by the engineer in many applications because these charts summarize in one place the phase diagram, the PVT surface, and some of the derived thermodynamic properties. A temperature-entropy chart, for example, contains the phase boundaries, lines of constant pressure, volume, enthalpy, and quality. The earliest of these charts was prepared by Mullins, et al.[129]; however, it lacks information on the solid-liquid two phase region. The more recent version by Sindt and Mann[223] includes both solid-liquid and solid-vapor two phase regions. It has since been updated by Roder.[142]

Figure - 43

2.2.30. VAPOR PRESSURE[110,129,142,208,209,224]

Discussion - We are interested here only in vapor pressures at temperatures below the triple point ($\sim$ 13.8 K). These vapor pressures are often called sublimation pressures. Measurements or correlations prior to 1948, i.e., the paper of Woolley, et al.[110] are not reviewed. We note that differences in vapor pressure measurements by different observers are nearly always attributable to differences in the temperature scales used.

Direct experimental vapor pressure measurements on solid n-H_2 between 3.4 and 4.5 K were made by Borovik, Grishin, and Grishina.[208] Hydrogen gas was condensed on a cooled surface in a high vacuum. After establishment of equilibrium, the pressure was measured at which the rate of condensation and the rate of evaporation were equal. Errors in the measurement of temperature did not exceed $\pm$ 0.02 K, and pressure measurement error did not exceed 10% as reported by the authors.

Harrison, Fite, and Guthrie[209] experimentally determined the vapor pressure of solid n-H_2 from 4.7 to 11.1 K. For the two experimental temperature ranges, 4.7 - 5.2 K and 6.5 - 11.1 K, the pressure readings were taken at room temperature using a gauge connected by a tube to the low temperature region containing the solid hydrogen, and corrections were made in the calculations when necessary.

A much more recent survey of the vapor pressure of the hydrogen isotopes has been prepared by Souers, et al.[224]

Tables of Values - parahydrogen, Table 12; normal hydrogen, Table 27

Figure - 44

Equations - One of the drawbacks of the earlier calculation by Mullins, et al.[129] is that the authors presented no explicit equation for the vapor pressure of the solid. Indeed they could not because one can either force

exact thermodynamic consistency or use an explicit vapor pressure equation, but not both. The form of the vapor pressure equation is dictated by thermodynamics. Integration of the Clausius-Clapeyron equation assuming the vapor phase to be an ideal gas leads to the Kirchoff-Rankine equation:

$$\log P = A/T + B \log T + C .$$

Parahydrogen

For parahydrogen the equation is constrained to the triple point P_t = 0.00704 MPa (0.0695 atm), T_t = 13.800 K, and in other ways to force thermodynamic consistency.[142] The coefficients are:

A = -90.77568949 B = 2.489830940 and C = 4.009857354

where P is in mmHg* and T is in K.

Normal Hydrogen

Harrison, Fite and Guthrie[209] represent their data by the equation

$$\log_{10} P = -\frac{43.39}{T} + 2.5 \log_{10} T + 2.047$$

which is used in Figure 44 for temperatures up to 10 K, where P is in mm Hg* and T is in K. Above 10 K the results of Wooley et al.[110] are shown in Figure 44.

Uncertainty - For parahydrogen[142] intercomparison to the available experimental vapor pressures shows the maximum deviation in pressure down to 10 K is less than 1%. The simple equation cannot, however, represent the data down to low temperatures, say 3 or 4 K. In this temperature range the departure between predicted and experimental vapor pressures (for normal hydrogen) increases to nearly 200%. Additional terms in the vapor pressure equation improve the representation of the vapor pressures but not the heats of sublimation calculated from the vapor pressure derivative. For normal

*(mmHg) x (1.3332×10^{-4}) = MPa

hydrogen the departures between experimental and calculated vapor pressures are on the order of 5%, however the cross-correlation with the heats of sublimation has not been done, and larger deviations are to be expected if thermodynamic consistency is forced.

2.2.31. VIRIAL COEFFICIENTS

Discussion - No virial coefficients have been measured experimentally for temperatures at or below the triple point. Extrapolation from temperatures where these coefficients have been measured is often done. As with any extrapolation, care must be taken so that the results remain physically realistic. A check on the contribution that each extrapolated term makes to any given virial expansion is highly recommended.

CHAPTER THREE

SELECTED THERMOPHYSICAL, CHEMICAL, AND COMBUSTION PROPERTIES OF HYDROGEN

Jesse Hord

3.1. INTRODUCTION

Only those properties deemed appropriate for safety analyses are treated in this chapter. Certain physical, chemical, and combustion properties of hydrogen are essential ingredients for intelligent safety studies in any potential fuel application. Evaluation of the safety hazards of a particular fuel is a highly complex task requiring interpretation of these specific technical data and intercomparisons with other fuels. To permit insight and provide perspective for the relative safety of hydrogen, comparative data are given in Table 28 for hydrogen, methane, and gasoline. Methane is the major constituent of most compressed natural gases and of liquefied natural gas. The technical data, listed in Table 28, were obtained from numerous sources and are believed to be the best available. Some of the data given in Table 28 were obtained by giving weighted consideration to several sources of data and by performing appropriate computations.

Most of the properties listed in Table 28 will be familiar to the average reader and have been discussed in Chapters One and Two; however, each of the combustion properties will be briefly described in this chapter because of their importance to safety analyses and because some of them are not commonly used properties. The thermophysical properties conform with the conventionally accepted definitions; however, explanatory notes are provided at the bottom of Table 28 to explain the bases for some of the "gasoline" properties. The heats of fusion and sublimation are taken at the triple point (at the freezing point for gasoline) and the heats of vaporization are taken at the normal boiling point. The combustion properties are defined in the following subsections. For extended discussions of these properties and hydrogen fire and explosion hazards, see Hord.[225] References 225-343 pertain to hydrogen safety.

3.2. DISCUSSION OF THE PROPERTIES

3.2.1. LIMITS OF FLAMMABILITY IN AIR[232,237,238,242 264]

These limits are defined as the range of concentrations of gaseous fuel in air at which the mixture will burn, i.e., a homogeneous fuel-air mixture will propagate a flame within a limited range of compositions. These limits are determined experimentally[264] by visually observing upward propagation of flames through flammable mixtures in vertical tubes. The wide flammability limits of hydrogen are of practical significance only when fuel leakage into enclosed spaces is a major concern. In this case the flammable limits of hydrogen are sufficiently wide to enhance the probability of combustion from a random ignition source. This flammability characteristic should not preclude the use of hydrogen because the lower flammable limit (LFL) is the vital one in most applications. The LFL is important because ignition sources are nearly always present when a leaking fuel first reaches combustible proportions in air.

3.2.2. LIMITS OF DETONABILITY IN AIR[239,243,244,259,265]

These limits are defined as the range of concentrations of gaseous fuel in air at which the mixture will detonate, i.e., the flame front will propagate at supersonic speed. These limits are usually determined by measuring the rate of propagation[243,259,265] of combustion-supported pressure waves in long horizontal tubes filled with combustible mixtures of fuel in air.

3.2.3. STOICHIOMETRIC COMPOSITION IN AIR

This composition defines the concentration of fuel in air at which all of the fuel and oxygen in the mixture are consumed by the reaction and maximum combustion energy is realized.

3.2.4. MINIMUM ENERGY FOR IGNITION IN AIR[240,245,266,267,286]

This energy is defined as the minimum spark energy required to ignite the most easily ignitable concentration of fuel in air. The most easily ignited mixture of fuel in air is usually not the stoichiometric composition. To determine the minimum ignition energy, a calibrated capacitor is charged to a specified voltage and discharged through an arc between parallel plate electrodes that are immersed in the combustible mixtures of gases. Ignition energy is calculated from $(1/2)CV^2$ (see References 266,267).

The minimum spark energy required for ignition of hydrogen in air is about an order of magnitude less than that for methane or gasoline; however, the ignition energy for all three fuels is sufficiently low that ignition is relatively assured in the presence of thermal (weak) ignition sources, e.g., sparks, matches, hot surfaces, or open flames. Even a weak spark due to the discharge of static electricity from a human body may be sufficient to ignite any of these fuels in air -- 10 mJ sparks may be produced in such electrostatic discharges.[286]

3.2.5. AUTOIGNITION TEMPERATURE[232,241,242,268]

The minimum temperature at which a combustible mixture of fuel and air can be ignited by a hot surface is the autoignition temperature.

Although hydrogen has a higher autoignition temperature than methane or gasoline, its low ignition energy characteristic makes it more readily ignitable than either of the hydrocarbon fuels. The hot air-jet ignition temperature (Subsection 3.2.6.) is highest for methane and lowest for hydrogen; therefore, hydrogen is easiest to ignite by jets of hot combustion products emitted from an adjacent enclosure. The flash point (see Subsection 3.2.20) is meaningless for the cryogenic fuels, hydrogen and methane, within

the temperature range of interest because these fuels will flash at all temperatures above their normal boiling points. The boiling points of the cryogenic liquid fuels are so low that these fuels are considered to behave like gases. The flash point of gasoline is also well below room temperature; therefore, all three fuels must be considered volatile and will generate sufficient vapor to create a fire hazard at earth surface temperatures. Then, all three fuels are relatively easy to ignite. Hydrogen is most susceptible while methane and gasoline appear to be equally susceptible to ignition.

3.2.6. HOT AIR-JET IGNITION TEMPERATURE[246,269,270]

This ignition temperature is defined as the temperature of a jet of hot air as it enters pure fuel vapors or a combustible fuel-air mixture at NTP (1 atm and 20°C) and causes ignition to occur. The data given in Table 28 represent the jet temperature of hot air as it enters pure fuel vapors at NTP. The jet diameter for these data is 0.4 cm. This ignition temperature decreases with increasing jet diameter and for a given jet diameter the hot gas jet ignition temperature increases if hot jets of nitrogen gas (rather than air) are squirted into combustible fuel-air mixtures.[269] The hot gas jet ignition temperature is dependent upon the composition of the combustible mixture and the velocity of the jet of hot gas.

3.2.7. FLAME TEMPERATURE IN AIR[247,248,271]

The flame temperature in air is defined as the temperature within the flame when premixed stoichiometric fuel-air mixtures are burned in the open

air. Fires at the scenes of fuel spills or leaks more closely simulate stationary gaseous diffusion flames which burn at lower temperatures. Detailed discussions on this topic and experimental techniques are reviewed by Lewis and von Elbe.[271]

3.2.8. PERCENTAGE OF THERMAL ENERGY RADIATED FROM FLAME TO SURROUNDINGS[249,250]

The percentage of thermal energy radiated from a flame to its surroundings is defined as the percentage of the heat of combustion (high) that is radiated from the combustion zone to its surroundings. The higher heating value of every flame is eventually dissipated by radiative processes. The data given in Table 28 are for flames fueled by vaporization of pools of liquid fuels in an air environment. These data are similar to those obtained in laboratory experiments with stationary gaseous diffusion flames.[249,250] Atmospheric moisture absorbs thermal energy radiated from a fire and can reduce the values recorded in Table 28. Hydrogen fires benefit most from this absorption effect,[249] e.g., it is estimated that 45 percent of radiant hydrogen flame energy is absorbed within a distance of 8 m in 25°C air containing water vapor at 0.002 MPa (15 mmHg) partial pressure.

3.2.9. BURNING VELOCITY IN NTP[a] AIR[242,243,248,251,252,255,287-289,311]

The burning velocity in NTP air is defined as the subsonic velocity at which a flame propagates through a flammable fuel-air mixture. This velocity is usually determined in the laboratory by measuring the velocity of gas flow to a bunsen burner.[251]

[a] NTP = Normal temperature and pressure (1 atm and 20 C).

The burning velocity is a fundamental property of a combustible gas mixture and should not be confused with the flame speed.[287] The burning velocity influences the severity of the explosion and along with quenching gap is important in the design of flame arresters.[287] Higher burning velocities indicate a greater tendency for the combustible gas mixture to support the transition from deflagration to detonation in long tunnels or pipes. The instantaneous pressure rise due to the ignition of a fuel-air mixture contained in a spherical vessel is proportional to the cube of the burning velocity.[288] Available data[289] indicate that the pressure rise ratios for adiabatic combustion of stoichiometric mixtures of hydrogen-air and methane-air in closed vessels are nearly identical. Similar data[255] produced pressure rise ratios for hydrogen-air that were 20 to 40 percent higher than those for gasoline-air. In long tubes or tunnels, hydrogen-air mixtures will transit to detonation more rapidly than methane-air or gasoline-air mixtures; therefore, overpressure hazards in confined spaces are enhanced in hydrogen systems. Thus, the high burning velocity of hydrogen is an indication of its high explosive potential and of the difficulty of confining or arresting hydrogen flames and explosions. Industrial equipment is currently available to safely confine hydrogen explosions but pipeline flame arresters, though successful in certain hydrogen-air combustion applications, are not yet considered reliable.[311]

3.2.10. DETONATION VELOCITY IN NTP AIR[243,253,254,259]

The detonation velocity is the supersonic velocity at which a flame (and accompanying pressure wave) propagates through a detonable fuel-air mixture.

3.2.11. DIFFUSION COEFFICIENT IN NTP AIR[272]

The diffusivity or coefficient of diffusion is a parameter used in Fick's equation to describe the rate at which a gaseous fuel diffuses through air. For a given fuel concentration gradient the mass diffusion flow rate is proportional to the diffusion coefficient. This coefficient can be computed from an empirical expression[272] that is based on the kinetic theory of gases.

3.2.12. DIFFUSION VELOCITY IN NTP AIR[273]

The diffusion velocity is simply the velocity at which a gaseous fuel diffuses through air. For a specified fuel concentration gradient the diffusion velocity is proportional to the diffusion coefficient and can be estimated from Stefan's equation.[273] Diffusion velocity varies with temperature according to $T^{3/2}$ and consequently low temperature gases produced by cryogenic liquid fuel spills will diffuse more slowly than NTP fuel gases. The values recorded in Table 28 are based on NTP fuel gas and NTP air densities and fuel concentrations that vary from 99.99 percent to 0.0 percent over path lengths of 3 cm to 30 m.

3.2.13. BUOYANT VELOCITY IN NTP AIR[249,250,274,275,282,320]

The buoyant velocity is the velocity at which gaseous fuels rise in air under the influence of buoyant forces. This velocity cannot be determined in a direct manner as it is dependent upon drag and friction forces that oppose buoyant forces acting on the rising volume of gaseous fuel. Atmospheric turbulence as well as shape and size of the rising volume of gas can affect the terminal velocity of the buoyant gas. Buoyant forces are related to the

difference in air and fuel densities; therefore, cold, dense fuel gases produced by cryogenic fuel spills will rise more slowly than NTP fuel gases. The buoyant velocities recorded in Table 28 were estimated from fundamental principles of dynamics and with the aid of empirical data[274,275]; it was assumed that the radii of the buoyant masses of NTP fuel gas varied from 3 cm to 1.5 m.

The rate at which fuel vapors mix with air is indicated by their diffusion velocities and their buoyant velocities. The buoyant effect is dominant for hydrogen and methane and from the data listed in Table 28 it is apparent that hydrogen can be expected to mix with air more rapidly than methane or gasoline -- the latter is obviously the slowest mixing fuel of the three fuels considered. In the event of a fuel spill, one could expect hydrogen to form combustible mixtures more rapidly than methane because hydrogen has a higher buoyant velocity and a slightly lower flammable limit. Again, gasoline would be orders of magnitude slower than hydrogen or methane in forming combustible mixtures in air. In some fuel applications these relative mixing times may be important while in others they are meaningless, e.g., an instantaneous fire hazard exists for the impact rupture of an auto fuel tank irrespective of the type of fuel carried.

Because of their higher buoyant velocities, hydrogen and methane can also be expected to disperse more rapidly than gasoline and thus shorten the duration of the flammable hazard. Even though the upper flammable limit (UFL) of hydrogen is much higher than that of methane, the higher buoyant velocity of hydrogen permits it to disperse to concentrations below the lower flammable limit (LFL) more rapidly[282] than methane. Thus, one could expect a fire hazard to exist more readily with hydrogen, methane, and gasoline respectively, and to persist in the inverse order.

Some caution must be exercised in analyzing fuel mixing and dispersion rates by comparing relative buoyant and diffusion velocities of the NTP fuel gases. In large cryogenic liquid fuel spills, the vaporization of liquid and warming of the vapor can cool large masses of air. In addition, NBP hydrogen vapor density approaches that of NTP air while NBP methane vapor density is greater than the density of NTP air. Consequently, for some finite period of time these cold vapor-air mixtures are nonbuoyant and may extend to appreciable distances from the spill. Therefore, both the range and duration of the fire hazard may be extended somewhat when cryogenic liquid fuels are spilled. More definitive experimental data are needed in this area to supplement existing knowledge.[249,250,320]

3.2.14. MAXIMUM EXPERIMENTAL SAFE GAP (MESG) IN NTP AIR[255,256,276]

The MESG is defined as the maximum permissible clearance, between flat parallel steel surfaces, that prevents the propagation of dangerous flames or sparks through the gap. The MESG is measured by igniting a combustible fuel-air mixture inside of a test enclosure and observing a similar combustible mixture surrounding the enclosure to detect its ignition. The MESG is the largest gap size that does not permit ignition outside of the test enclosure. The MESG is dependent upon the test gap flange width, composition of combustible mixtures inside of and surrounding the test enclosure, the initial pressure and temperature of the mixture, location of the ignition source and enclosure geometry.[255,276] The hydrogen and gasoline MESG data recorded in Table 28 were obtained using parallel steel flanges that were 1.905 cm wide

and 10.16 cm long. The methane MESG data were obtained using an 8 liter chamber with equatorial flanges that were 2.54 cm wide. MESG data are of vital importance to the design and manufacture of explosion-proof equipment.

3.2.15. QUENCHING GAP IN NTP AIR[240,257,277,287]

The quenching gap is defined as the spark gap between two flat parallel plate electrodes at which ignition of combustible fuel-air mixtures is suppressed, i.e., smaller gaps have the effect of totally supressing spark ignition.[240,257] Other types of electrode geometries are also used in laboratory measurements[240,257] of quenching distance. The experimental data[240,257,277] are dependent upon the temperature, pressure, and composition of the combustible gas mixture and electrode configuration. Experiments have shown that the quenching distance is relatively independent of the mode of ignition. The quenching distance is sometimes determined by measuring the smallest diameter tube through which flame will propagate in a flammable NTP mixture of fuel-air that fills the tube. Similarly, quenching distances can be obtained by measuring the gap required to quench propagation of flame between flanges or plates that form a narrow channel and are filled with a flammable fuel-air mixture at NTP. In the latter two experiments the explosive gas mixture is ignited at one end of a long tube or channel by a pilot flame.

In general, faster-burning gases have smaller quenching gaps and flame arresters for faster-burning gases must have smaller apertures.[287] The quenching gap is the passage gap dimension required to prevent propagation of an open flame through a flammable fuel-air mixture that fills the passage and it is clearly distinguishable from the MESG. The latter is the maximum

permissible clearance between flanges to assure that an explosion does not propagate from within an enclosure to a flammable mixture surrounding the enclosure. Because of the high explosion pressures the MESG is always smaller than the quenching distance.

3.2.16. DETONATION INDUCTION DISTANCE IN NTP AIR[242,259,260,278]

The detonation induction distance is the distance required for a deflagration to transit to a detonation in a detonable fuel-air mixture. This distance is usually experimentally determined in a long cylindrical tube with a spark or hot wire ignitor on one end of the tube. The tube is instrumented along its length to sense the velocity of the flame front as it propagates through the detonable mixture of gases. The distance from the ignitor to the axial position in the tube where the flame front first attains the detonation velocity is reported as the induction distance. This distance is dependent upon the combustible mixture constituents, the pressure, temperature, and concentration of the gaseous mixture, the enclosure geometry[278] and strength of the ignition source.[242] A deflagration is a low order explosion resulting from subsonic flame speed, relative to the unburned gas. It is conventionally defined as a propagating reaction in which the energy transfer from the reaction zone to the unreacted zone is achieved through ordinary rate-limiting transport processes such as heat and mass transfer. A detonation is a high order explosion resulting from supersonic flame speed, relative to the unburned gas. It may be defined as a propagating reaction in which energy is transferred from the reaction zone to the unreacted zone on a reactive shock wave.

3.2.17. LIMITING OXYGEN INDEX[238,258]

The limiting oxygen index is the minimum concentration of oxygen that will support flame propagation in an unknown mixture of fuel, air, and nitrogen, e.g., no mixture of hydrogen, air, and nitrogen at NTP conditions will propagate flame if the mixture contains less than 5.0 volume percent oxygen.[238] Use of diluents other than nitrogen results in different values for the limiting oxygen index of each fuel.[238,258] The low values of limiting oxygen index reflects the high value of the upper flammable limit (UFL) for hydrogen-air mixtures.

3.2.18. VAPORIZATION RATES OF LIQUID POOLS WITHOUT BURNING[250]

The vaporization rate of a liquid pool (in the absence of burning) is determined by the rate at which the liquid level decreases after a pool of liquid fuel has been formed by spilling fuel onto a warm surface such as sand or soil. These evaporation rates are measured after subsidence of the violent boiling that accompanies the initial liquid spill. Vaporization rates of the cryogenic fuels can be expected to vary widely with the conductivity and heat capacity of the soil or other material confining the spilled liquid fuel. In the case of gasoline, vaporization rates will vary with the volatility of constituents (blend), age, fuel temperature, ground surface texture, and temperature, etc. Wind velocity influences the vaporization rate of all fuels considered herein.

3.2.19. BURNING RATES OF SPILLED LIQUID POOLS[249,250,342]

The burning rate is the rate at which the liquid level decreases after a pool of liquid fuel has been formed by spilling fuel onto a warm surface and the resultant vapor-air mixture has been ignited. Again, these burning rates are measured after the initial-spill violent boiling has subsided and the vapor is mixing and burning in air above the pool of spilled fuel. These burning rates may also be obtained by adding the vaporization rate (without burning) and the liquid level regression rate attributable to the burning of vapors in the open air over liquid fuels that are contained in open-mouthed insulated vessels. Steady state burning rates increase with liquid pool diameter while vaporization rates continuously decrease with time, irrespective of pool size. Burning rates can be expected to vary with pool diameter and wind velocity.

As indicated in Table 28, the volumetric vaporization rates and burning rates are highest for hydrogen, methane, and gasoline, respectively. Consequently, for a given liquid spillage volume, gasoline fires will last the longest and hydrogen fires the shortest while all of the fuels burn at about the same flame temperature. The thermal energy radiated from these pool-fed fires may be computed by multiplying the appropriate (burning rate) X (NBP liquid density) X (high heat of combustion) X (percentage of thermal energy radiated from the flame to its surroundings). The radiated thermal energy should not exceed 276 W/cm^2 of pool liquid-vapor surface area for hydrogen, 155 W/cm^2 for methane, or 212 W/cm^2 for gasoline. Then, the scene of a hydrogen fire may be hotter than that of a hydrocarbon fire, but the hydrocarbon fires will last five to ten times longer that hydrogen fires (for equivalent fuel spillage volumes).

3.2.20. FLASH POINT[232,279]

The flash point is the minimum liquid fuel temperature required to provide a fuel vapor-air mixture above the surface of the liquid that will propagate a flame. The liquid fuel is heated in an open or closed cup[279] until the vaporization rate is sufficient to form a mixture of fuel vapor and air that is within the flammable limits near the liquid surface. Ignition is accomplished with an open flame near the surface of the liquid.

3.2.21. ENERGY OF EXPLOSION[290,298,309,320]

The energy of explosion is the theoretical maximum energy available from a chemical explosion. This maximum energy release is determined by computing the isothermal decrease in the Helmholtz free-energy function. Explosive energies listed in Table 28 are expressed in terms of equivalent quantities of TNT (symmetrical trinitrotoluene) and may be converted directly to energy units by multiplying by 4602 J/(g TNT). Note that hydrogen is the most potent on a mass basis and the least potent on a volumetric basis. The explosive potential per kJ of stored heating value (based on the high heat of combustion) is 0.17 (g TNT)/kJ for hydrogen, 0.19 (g TNT)/kJ for methane, and 0.21 (g TNT)/kJ for gasoline. Thus, for equivalent energy storage, hydrogen has the least theoretical explosive potential of the three fuels.

It must be emphasized that only a fraction of this theoretical explosive yield can be realized in an actual open-air mishap because it is virtually impossible to spill or release a large quantity of fuel and have all of it mixed in proper proportions with air prior to ignition. Experimental data and computations indicate that the fraction[290,309,320] of fuel within the combustible range at any time following a massive or continuous fuel spillage

will be less than 10 percent of the quantity spilled. Such explosive yield data are meager for all three fuels; however, the vapor or gas phase mixing limitations are equally applicable to all fuels. Hydrogen disperses much more rapidly than methane or gasoline, but it also has much wider flammable and detonable limits, etc. Thus, in the absence of more definitive experimental data it is impossible to accurately assess the probable explosive yield attributable to accidental release and ignition of hydrogen, methane, or gasoline in air. The 'energy of explosion' values listed in Table 28 should be considered theoretical maximums and yield factors of 10 percent are considered reasonable for fuel-air explosions. Higher yield factors are possible in liquid bipropellant explosions.[298]

3.2.22. TOXICITY[261-263,280,281]

Although not a combustion property, the toxicity of a fuel is an important factor in safety studies. Toxicity is the quality or condition of being harmful, destructive, deadly, or poisonous to living organisms. The toxicity of a fuel can only be described in terms of its effects on living organisms and specifically in terms of its effects on humans.[280] Toxicity ratings[280] are (of necessity) relative values and threshold limit values for exposure to toxic substances are published annually (see Reference 281).

3.3 DATA GRAPHS

3.3.1. DISCUSSION OF THE FIGURES

Personnel safety criteria and hydrogen storage standards have been developed by combining the properties data in Table 28 with certain technical formulae and experimental results. These safety and storage criteria are

summarized on Figures 45-47. The derivation and use of data shown on these figures are fully discussed in summary documents[225,290] treating the explosive hazards of hydrogen and only a brief summary of these figures is given here.

Figures 45 and 46 summarize much of the fire and explosive hazard data for experimental areas and illustrate the variation in conservatism of various authorities that generate safety criteria. Obviously, when in doubt, the more conservative criteria should be used. The overpressure band on Figure 45 corresponds to breakage of ordinary window glass (3.5 to 7 kPa) and the overpressure band on Figure 46 relates to the estimated external pressure capability of liquid hydrogen storage dewars. Note that the data on both of these figures specify safe unbarricaded distances. Safe barricaded distances for TNT and fuel-air explosions may also be estimated from data made available in References 290, 298, and 308.

Unbarricaded distances required for the protection of personnel in inhabited buildings that are exposed to shrapnel from TNT explosions are indicated by curve 6 on Figure 45. These data also predict the maximum observed fragment distances for space vehicle explosions[298] and are more restrictive than the unbarricaded distances required for shrapnel protection of personnel on roadways (see curve 2 on Figure 45).

A single series of documents[298] offers comprehensive treatment of overpressure, impulse, fireballs, shrapnel, barricades, structural response, and physiological effects, as they relate to propellant explosions. These documents are believed to be applicable to fuel-air explosions where the TNT equivalent is properly estimated.

Figure 47 provides a ready comparison of industrially accepted fuel storage standards for hydrogen, liquefied natural gas (LNG), and gasoline. By

comparing curves 1 and 4 on Figure 47 with the data given on Figures 45 and 46, we find that the industrial quantity-distance standards (Figure 47) for hydrogen are less demanding than those suggested for experimental areas (Figures 45 and 46). Also, by comparing curves 1, 2, 3 and curves 4, 5, 6 on Figure 47, we observe that industrial storage standards are more restrictive for hydrogen, methane, and gasoline, respectively.

Curve 3 on Figure 47 represents the minimal distance for separation of two adjacent above-ground gasoline storage tanks. The distance[341] between such tanks shall not be less than 0.9 m (three feet) and not less than one-sixth the sum of the diameters of two adjacent tanks. When the diameter of one tank is less than one-half the diameter of the adjacent tank, the distance[341] between the two tanks shall not be less than one-half the diameter of the smaller tank.

Curves 6A and 6B on Figure 47 represent the variation in quantity-distance standards for the protection of personnel in buildings adjacent to gasoline storage tanks. These curves bound standards[341] that vary with type of tank construction, fire control measures and protection for exposures, tank operating pressure, and emergency venting equipment.

The distance[341] from any part of an underground tank (storing gasoline) to the nearest wall of any basement or pit shall be not less than 0.3 m (one foot), and not less than 0.9 m (three feet) from inhabited buildings.

It is apparent that industrial storage standards are least restrictive for gasoline; however, the industrial storage standards for LNG and hydrogen fuels are not prohibitive and should not limit their use.

CHAPTER FOUR

MISCELLANEOUS PROPERTIES OF HYDROGEN

Jesse Hord, Robert D. McCarty, and Hans M. Roder

4.1. INTRODUCTION

This chapter collects many of the properties, of interest to scientists and engineers, that are not readily categorized and treated in one of the previous chapters.

4.2. DISCUSSION OF THE PROPERTIES

4.2.1. RADIATIVE PROPERTIES

No references to the emissivity of hydrogen were found in the literature; see Subsection 4.2.2. for spectral absorption.

4.2.2. INFRARED ABSORPTION[344-350]

Definition - The absorption coefficient, k, of a material is a measure of the loss in intensity, I, of radiation which is passed through a unit length of a homogeneous region of the material, i.e., if Z is the axis of propagation, then $dI/I = -kdZ$ or in integral form $I = I_o e^{-kZ}$.

Absorption Bands - k is for most gases a strong function of frequency, being zero over large ranges of frequency and sharply peaked in certain other regions. It is difficult to summarize this subject because so many transitions are possible for hydrogen, i.e., rotational, vibrational, Raman, ultraviolet, infrared, and far infrared spectra have all been investigated. An extensive survey of induced transitions in liquid and solid hydrogen up to about 1965 is given by Colpa.[348] More recent data for solid hydrogen includes Raman spectra at the lambda transition[370] and both infrared and Raman spectra at pressures up to 1500 MPa (15 kbar).[371] As with other gases, the absorption

coefficient k is density dependent, varying roughly as the density squared (see Figure 48); in the particular case of hydrogen, k is significantly dependent upon the ortho-para composition (see Figures 49 and 50). For an estimate of importance to heat transfer problems, see Reference 349.

Figure - 48, Raman;[346] 49, far infrared (rotational);[344] 50, far infrared (translational);[344] 51, far infrared (rotational);[345] 52, ultraviolet.[347]

Uncertainty - The uncertainty varies with frequency but a typical conservative estimate is 5%. Note: Differences of 30 to 40% for the peak absorption between Jones[344,350] and others have not been explained.

4.2.3. ISOTOPES[19]

Definition - An isotope is an atom of an element having a different nuclear mass and atomic weight from other atoms of the same element.

Discussion - Hydrogen has two such isotopes, deuterium with an atomic weight of 2 and tritium with an atomic weight of 3. The three different kinds of hydrogen atoms may combine in six different ways to form a molecule, i.e., H_2,D_2,T_2,HD,HT, and DT. There are some data in the literature for D_2 but very little for any of the tritium-containing molecules. The isotopes are beyond the scope of this work, and the reader is referred to Reference 19 for data on the hydrogen isotopes. Also, isotope data pertinent to magnetic fusion applications are being compiled at the Lawrence Livermore Laboratory.[139]

4.2.4. MIXTURE PROPERTIES[351-359]

Thermodynamic Properties - A review by Hiza et al.[353] lists experimental data for fluid mixtures properties of cryogenic interest; included are data

for hydrogen systems. In addition to the above review, two reviews[354,355] give experimental data and some theoretical discussion of solid-vapor equilibria. For liquid-vapor equilibria, a bibliography by Oellrich et al.[356] gives references for both experimental and theoretical studies; this review includes all components with normal boiling points below 350 K. Also, the liquid-vapor section of the review by Hiza et al. has been published.[357] Figure 53 can be used to obtain a rough estimate of the solubility of hydrogen in various solvents as a function of temperature and pressure. To estimate hydrogen solubility use

$$X(P,T) = \frac{X(100,T)}{100 - p_o(T)} \cdot P$$

where X(P,T) is the mole percent H_2 in the solvent at the desired pressure P, in atmospheres, and temperature T, in Kelvin; X(100,T) is the mole percent in the solvent at 100 atm and T which is obtained from Figure 53; $p_o(T)$ is the solvent's vapor pressure at T. It is recommended that the above equation be used only for pressures of 10.1325 MPa (100 atm) or less and that the curves not be extrapolated to higher temperature; one should refer to the original data (see References 351, 352, 360-368) for higher temperatures or pressures. To estimate the vapor phase composition one can use $y = 100 \times p_o(T)/P$, where y is the mole percent of the solvent in the vapor phase; however, this estimate will always be too low, especially if the pressure is more than 1.01325 MPa (10 atm) above the vapor pressure. For additional information on thermodynamic properties of mixtures, see References 351 to 359. Solubility references differ from liquid-vapor equilibria references in that they consider only liquid phase compositions, whereas the liquid-vapor references consider both phases. Mixture data on isotopes pertinent to magnetic fusion applications are being compiled

at the Lawrence Livermore Laboratory.[139] The influence of helium and neon impurities on freezing of hydrogen isotopes is treated in Reference 369.

Transport Properties of Mixtures - This subsection considers only viscosity and thermal conductivity. For dilute gas mixtures, Wilke's correlation can be used to estimate the viscosity[358] and thermal conductivity.[359] To our knowledge, no reliable technique exists for estimating the effect of hydrogen concentration on the viscosity or thermal conductivity in the liquid phase.

4.2.5. METALLIC HYDROGEN[170,207,372-380]

Definition - Solid hydrogen under extreme pressure (about 2 to 3 x 10^5 MPa) is thought to undergo a phase transition to the metallic state and may be superconducting. The subject of metallic hydrogen is beyond the scope of this work, but References 372 to 380 will serve as a starting point for those who wish to pursue the subject further. These citations include surveys and summaries,[374-377] Russian static press efforts,[378] Japanese static press efforts,[379] a metallic hydrogen phase diagram,[207] and observations[380] of a new solid phase transition at pressures below those where the metallic phase transition occurs.

4.2.6. ORTHO-PARA MODIFICATIONS[17,19,110,381,382]

Definition - The hydrogen atom is composed of a nucleus of one proton and an electron orbiting around the nucleus. The hydrogen molecule is composed of two hydrogen atoms; however, there are two modifications of hydrogen molecules called orthohydrogen and parahydrogen. The differentiating feature of these molecules is the relative orientation of the nuclear spin of the individual atoms. The nuclear spin is a rotational motion of the nucleus about an axis perpendicular to the molecular axis. It is therefore possible to have two

relative orientations of these nuclear spins, i.e., the spins may be in the same direction or they may be in opposite directions. These orientations are commonly called parallel and antiparallel, respectively. The nuclear spin is a quantized motion; therefore, only certain motions are allowed. Associated with this quantization are quantum numbers for the spin and the corresponding energy levels. The molecules with antiparallel nuclear spins, called parahydrogen, have even quantum numbers and are in the lowest energy state. Conversely, the molecules with parallel nuclear spins, called orthohydrogen, have odd quantum numbers and are in a higher energy level.

Discussion - Fluid hydrogen may be thought of as a binary mixture of two different species of molecules differing from each other in physical properties. These differences are easily detectable on a macroscopic scale and in some cases are of great importance in design problems. The percentage of the ortho-para concentrations in the mixture is temperature dependent. The term equilibrium hydrogen is, as the name implies, the equilibrium concentration at a given temperature. For example, at a temperature of about 80 K, the equilibrium concentration of ortho and para is 50% for each. Near ambient temperature the composition is 75% ortho and 25% para. This 25-75 composition is called normal hydrogen. See also Subsection 2.2.19.

Tables of Values - These tables are from Reference 110.

Units	Range of table	Table location
% Para	0 - 500 K	29

Figure - 54

Equation - None

Range of Values -

Units	20 K	300 K
% Para	99.821	25.072

Uncertainty - These values are estimated to be uncertain by less than 1%.

Heat of Conversion[110]

Definition - The conversion of orthohydrogen to parahydrogen is an exothermic process. The amount of heat given off in the conversion is temperature dependent.

Table - Values taken from Reference 110.

Units	Range of tables	Table location
cal/mol*	10 - 300 K	30

Figure - 55

Equation - None

Range of Values -

Units	10 K	300 K
J/g	527.14	27.56
(cal/mol)	(253.99)	(13.28)

Uncertainty - The uncertainty of the heats of conversion is estimated to be less than 0.1%.

Conversion Rates

Since the percentage of the ortho-para composition is temperature dependent, the rate of conversion is of interest in a variety of problems. The conversion of a nonequilibrium ortho-para composition to an equilibrium composition is a very slow process in the absence of a catalyst. This mode of conversion (no catalyst present) is called self-conversion. In general, the self-conversion rate is also a function of temperature. For example, at liquid air temperatures the half-life of the conversion is greater than 1 year, while at 923 K and 0.0067 MPa (50 mmHg) pressure the half-life is on the order of 10 min. The "half-life period" is defined as the amount of time required to convert 1/2 of the excess ortho or para composition present at the starting time.

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*(cal/mol) x 2.0755 = J/g.

Catalysis increases liquefaction energy requirements by approximately 15 percent. If normal hydrogen is liquefied and not converted by catalyst to the equilibrium concentration at 20 K, a portion of the liquid will boil away due to ortho-para conversion. Figure 56 shows the fraction of liquid hydrogen boiled off as a function of storage time and initial ortho content. This boil-off is due to the ortho-para heat of conversion only.

Tables of Values - None

Figure - 56

Catalytic Conversion Rates[382]

The ortho-para conversion process is greatly enhanced by catalysis; since many substances as well as magnetic and radiation fields will speed up the conversion, only a typical example of conversion will be given here. Weitzel et al.,[17] using 1.5 liters of unsupported hydrous ferric oxide granules, converted liquid normal hydrogen to 90 to 95% equilibrium H_2 at an average rate of 235 L/h.

Tables of Values - None

Figure - None

Equation - None

Property Differences - In general, the larger differences in the properties of ortho and parahydrogen will occur in the derived properties where heat is important. Properties like enthalpy, specific heat capacity, and thermal conductivity show large differences. On the other hand, the density of ortho-para mixtures will vary very little. The difference in density between normal and parahydrogen is probably less than about 0.3%, with normal hydrogen having the larger density. For differences in a particular property, the reader should consult Chapter One for a description of the property and see the figures listed below.

Figure - 57, density differences between normal and parahydrogen; 58, specific heat (heat capacity) differences between normal and parahydrogen; 59, thermal conductivity differences between normal and parahydrogen.

4.2.7. THERMAL TRANSPIRATION[383]

Definition - Thermal transpiration is the phenomenon of the flow of a gas at very low pressures through a capillary due to a temperature gradient. In a closed system, with a constant temperature gradient, a steady state pressure difference will occur between the ends of the capillary, provided the mean free path of the gas is about equal to, or larger than, the diameter of the tube.

Thermomolecular Pressure Difference

If, at the steady state, the pressure at the ends of the tube are P_H and P_C, corresponding to temperatures of T_H and T_C, then

$$\frac{P_H}{P_C} = \frac{T_H}{T_C}$$

where the subscripts H and C refer to hot and cold, respectively. The equation is only valid in the limit of $P \rightarrow 0$. At higher pressures, correction terms must be added. However, it must be remembered that thermal transpiration is an apparatus effect; therefore, correction terms to the equation should not be added for a particular gas but rather for a particular apparatus.

4.2.8. HEAT TRANSFER AND PRESSURIZATION PARAMETERS[4,7,8,384]

A number of thermodynamic expressions have become convenient for the engineer to use in dealing with the storage and transfer of liquefied gases. Tabulations for four such parameters for hydrogen have been included in this subsection.

Specific heat input (commonly symbolized by θ)

$$V\left(\frac{\partial H}{\partial V}\right)_P = \rho C_p \left[\left(\frac{\partial P}{\partial \rho}\right)_T \Big/ \left(\frac{\partial P}{\partial T}\right)_V\right]$$

Energy derivative (commonly symbolized by Φ)

$$V\left(\frac{\partial P}{\partial U}\right)_V = \frac{V}{C_v}\left(\frac{\partial P}{\partial T}\right)_V$$

Isothermal bulk modulus (commonly symbolized by α)

$$V\left(\frac{\partial P}{\partial V}\right)_T = -\rho\left(\frac{\partial P}{\partial \rho}\right)_T$$

Volume expansivity (commonly symbolized by β)

$$\frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P = \frac{1}{\rho}\left(\frac{\partial P}{\partial T}\right)_\rho \Big/ \left(\frac{\partial P}{\partial \rho}\right)_T$$

Specific Heat Input, θ - This parameter is sometimes referred to as dQ/dM, heat input per increment of mass. It is frequently expressed in terms of density instead of specific volume, i.e., $\rho(\partial H/\partial \rho)_p$. It is the amount of heat required to expel a unit mass of fluid from a storage vessel. The units are the same as those for enthalpy: J/g.

Energy Derivative, Φ - This quantity is also frequently expressed in density by substituting $1/\rho$ for V. Typical units are MPa-cm^3/J. This parameter is often used in conjunction with the specific heat input, θ, to determine expulsion rates from rigid containers.

Isothermal Bulk Modulus, α - Likewise, this parameter is frequently expressed in density; $-\rho(\partial P/\partial \rho)_T$ with the usual units of MPa. It is the reciprocal of isothermal compressibility $-(\partial V/\partial P)_T/V$ and is a convenient factor to use in certain engineering calculations.

Volume Expansivity, β - Often called simply expansivity or constant pressure expansion, it is separately described in Subsection 1.2.29. Units are K^{-1}. A related expression is the constant pressure expansion coefficient,

$T(\partial V/\partial T)_P/V$, but values for this latter expression have not been tabulated and are not as widely used.

Tables of Values - These parameters are tabulated in Tables 2, 3, 8, and 9 as follows:

Parameter	Units	Range of tables		Table location
$\theta = V(\partial H/\partial V)_P$	J/g			
$\Phi = V(\partial P/\partial U)_V$	MPa-m^3/kJ	13.8 - 3000 K	0.01 - 100 MPa	2,8
		Saturation boundary	0.01 - 1.3 MPa	3,9
$\alpha = -V(\partial P/\partial V)_T$	MPa			
$\beta = (\partial V/\partial T)_P/V$	K^{-1}			

Figure - 60, 61

Equations - None except as shown above

Range of Values -

Parameter	Units	Triple point Liquid	Triple point Vapor	Boiling point Liquid	Boiling point Vapor	Critical point	STP
Para							
θ	J/g	a	a	a	a	a	4455
Φ	MPa-m^3/kJ	a	a	a	a	0[b]	0.0385
α	MPa	a	a	a	a	0	a
β	K^{-1}	a	a	a	a	∞	a
Normal							
θ	J/g	622.6	139.8	587.9	189.1	199.0	4295
Φ	(MPa-m^3/kJ)x10^2	0.2565	0.0668	0.2018	0.0667	0[b]	0.0405
α	MPa	90.34	0.0069	50.21	0.0903	0	0.101
β	K^{-1}	0.0102	0.0752	0.0164	0.0642	∞	0.0033

[a]Values the same as normal table.

[b]Not conclusive; may be finite but small value instead of 0.

Uncertainty - The uncertainties for each parameter are estimated as follows:

Parameter	Compressed liquid,%	Gas and supercritical,%
θ	3 - 5	3
Φ	3	2
α	3 - 5	2
β	3 - 5	2

4.2.9. SLUSH HYDROGEN TECHNOLOGY[385-393]

Definition - Slush hydrogen is a homogeneous mixture of coexisting liquid and solid hydrogen. Slush hydrogen is more dense and has a greater heat capacity than liquid hydrogen; therefore, it offers certain advantages in volume-restricted aerospace missions, e.g. deep space probes. The high density of slush allows more fuel to be carried within a prescribed tankage volume and the increased heat capacity increases non-venting storage times, thereby decreasing overboard vent losses and/or increasing mission duration. The density of slush that is 0.5 solid (by mass) hydrogen is 15.5% greater than that of normal boiling liquid hydrogen. Similarly 0.5 solid fraction slush hydrogen has 18.3% more heat capacity than normal boiling liquid. Slush heat capacity and density relationships are plotted on Figure 62.

Production - There are two recognized methods of producing slush hydrogen. One is the auger method[386] and the other is the freeze-thaw method.[385]

The auger method simply uses an auger rotating inside of an externally-insulated refrigerated cylinder that is submerged in liquid hydrogen. Hydrogen freezes on the internal walls of the cylinder and is continuously shaved or scraped off by the auger.[386] Commercial ice-makers operate on a similar

principle. Solid fraction is adjusted by the rate of outflow of slush and equivalent inflow of liquid. The auger method can be used in a continuous production mode and produces slush hydrogen at super-atmospheric pressures so that the slush can be pressure-transferred to storage containers. The auger method has been successfully used to produce small quantities[386] of slush hydrogen and should be practical for large scale production.

The freeze-thaw method has been used to generate small[385] and relatively large[392] quantities of slush hydrogen. This production technique requires that the ullage over a fixed volume of liquid be vacuum pumped until a solid layer forms at the liquid-vapor interface. The vacuum pumping is then stopped and the solid layer melts (thaws) and settles into the liquid. This cycle is repeated until the desired solid content has been formed. The solid is then mixed with the liquid by stirring to form a homogeneous mixture of solid and liquid. The porosity of the solid formed in this manner is a function of the pumping rate. Low pumping rates produce dense solid which when broken forms large particles of solid and will not form a homogeneous mixture with the liquid. Higher pumping rates produce a porous solid which is easily broken into much smaller particles and is easily mixed with the liquid to form a homogeneous mixture which may be defined as slush. This batch method is capable of producing slush in large quantities. Disadvantages of the method are: 1) A safety hazard exists because the required low ullage pressures ($\sim$ 0.0061 MPa) invite air leakage into the slush container, and 2) transfer of slush into a storage container requires ullage pressurization or pump-transfer. Maximum solid fractions achieved to date are $\sim$ 0.6 with 0.4 to 0.5 solid content being practical and easily accomplished.

Storage - The latent heat of fusion of the solid makes slush hydrogen more storable than subcooled liquid, i.e., the slush can absorb more energy (heat

leak) and reduce boil-off losses; however, the solid particles settle and tend to agglomerate in the absence of agitation. In low gravity environments this settling is of little concern and in one-g and high-g fields it can be overcome by using mixers.[393]

Some very interesting aging effects have been observed[385] in slush hydrogen. Although the change in the particle size was insignificant, the structure changed dramatically during aging. The solid particles were observed to change from particles with irregular rough edges to particles with smooth edges. The smaller particles would tend to combine with the larger particles to form a particle of higher density.

The rate of pressure-rise in slush filled vessels can be predicted if the storage vessel heat load distribution and heat transfer rates[388] are known. Idealized calculations[391], for uniformly distributed heat load, have been performed. These thermodynamic calculations assume that an insulated storage tank is filled at some specified fluid state (known solid fraction when fill is complete) and then sealed off. Its contents are allowed to warm up until the fluid pressure rises to the predetermined tank vent pressure. Both liquid and solid-liquid mixtures expand when warmed; therefore, the designer must specify an appropriate ullage (an unfilled portion of the vessel) to accommodate the fluid when it expands. Thus, calculational input parameters are tank volume, tank ullage, vent pressure, heat load (and distribution), heat transfer rates, and fresh-fill fluid state condition.

Handling - Slush hydrogen can be pressure transferred[385] through pipelines, orifices, flow devices, etc., using helium or hydrogen as a pressurant. In general, slush behaves as a conventional Newtonian fluid and pipeline pressure losses can be predicted[385] using the Fanning equation. Slush with 0.3 or less solid was found to have transfer losses of 10% less than those of the triple

point liquid when the Reynolds number was $\gtrsim 7 \times 10^5$. Slush can also be pumped[390] using conventional liquid hydrogen pumps. Slush with solid content of up to 0.6 may be pumped with losses similar to that of liquid hydrogen at its triple point.

Instrumentation - Commercial sensors are availabe to measure temperature, pressure, quantity, and flow of slush hydrogen in practical applications.[387] Germanium, platinum, and carbon thermometers are useful in measuring temperature.

Pressure can be measured using a cold flush-mounted pressure transducer or a remote transducer coupled via transmitting tubes. Care must be taken to avoid thermal-acoustic oscillations in these transmitting tubes and preventive measures include: Establishing a low-flow bleed rate through the tube; roughing the tube interior wall at its entrance (sensing or tap end); restricting flow in the tube by using small bore tubing or packing the bore with a wire or string; damping the oscillations by using a stepped diameter transmitting tube or by attaching a resonant cavity to the transmitting tube.

Volumetric flow can be measured with standard head-meter (orifice, nozzle, venturi) devices and microwave Doppler meters, and thermal boundary layer meters have been used[387] to determine mass flow. Fluid level gauging can be accomplished with rod-to-blade capacitance gauges,[387] carbon resistance point-sensor rakes, time-domain reflectometry (RF pulsed cable), and head-difference pressure gauges. Mass gauging has been accomplished using RF cavity mode analysis.[389] This technique uses a small antennae inside the metal tank to generate electromagnetic standing waves. These standing waves occur at resonant frequencies and resonance decreases with increasing quantities of dielectric fluid within the cavity (tank); i.e., the fluid slows propagation of the electromagnetic wave and mass content of the tank can be determined by measuring resonant frequencies.

Density or solid fraction can be determined by using Beta-ray or Gamma-ray attenuation,[387] capacitance methods, and the RF gauging technique. The capacitance techniques are currently considered the most dependable--the bulls-eye ring capacitor for point density measurements and the rod-to-blade capacitance for average zone density determinations.

Problems - Most of the difficulties expected with slush hydrogen applications have been exposed herein. Production should not be a safety problem if the auger method is adapted. Thermal acoustic oscillations in pressure-sensing lines and other plumbing (fill lines, relief tees, vent lines, etc.) will always be a problem but it can be solved by appropriate design and handling procedures. Likewise, the settling-aging-agglomeration and need-for-mixing problem will stay with us and can be overcome with existing technology. Mass flow and mass gauging measurements need to be improved. The thermal performance of aerospace propellant systems (insulated tanks, transfer lines, vents, etc.) must be improved to take full advantage of the high density and heat capacity of 0.5 solid fraction slush hydrogen. There are no known insurmountable problems that exclude the use of slush hydrogen; on the contrary, the use of slush hydrogen in properly engineered systems appears practical and in some cases very desirable.

Thermophysical Properties - See Subsection 2.2.23 and Figure 62.

4.2.10. OTHER MISCELLANEOUS PROPERTIES

Included in this subsection are properties that have not been discussed in the preceding pages and their corresponding references.

Property	Reference
Birefringence	394
Creep	395
Cryopumping	185, 396-404
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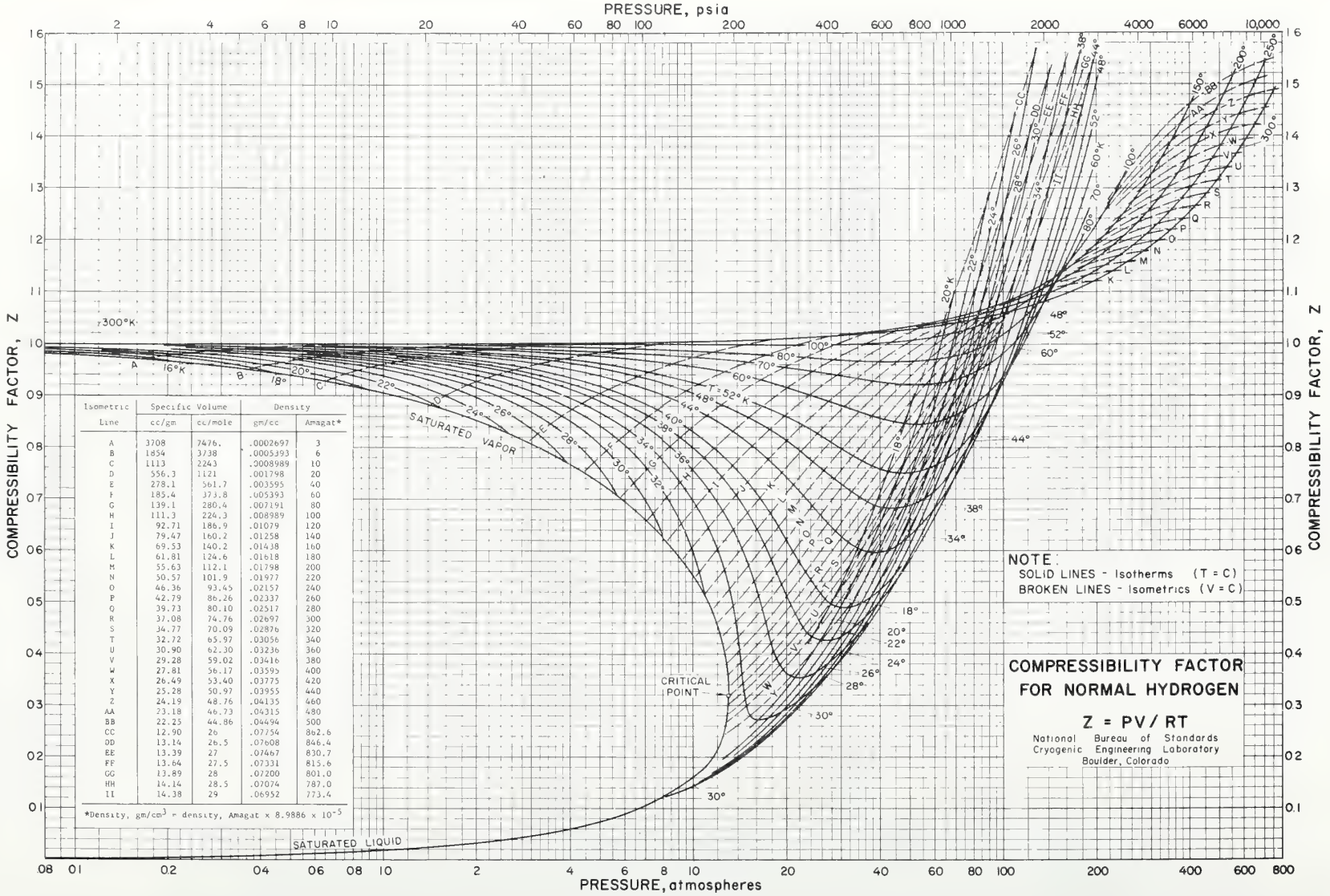
CHAPTER FIVE

DATA FIGURES



Isometric Line	Specific Volume cc/gm	Specific Volume cc/mole	Density gm/cc	Density Amagat*
A	3708	7476.	.0002697	3
B	1854	3738	.0005393	6
C	1113	2243	.0008989	10
D	556.3	1121	.001798	20
E	278.1	561.7	.003595	40
F	185.4	373.8	.005393	60
G	139.1	280.4	.007191	80
H	111.3	224.3	.008989	100
I	92.71	186.9	.01079	120
J	79.47	160.2	.01258	140
K	69.53	140.2	.01438	160
L	61.81	124.6	.01618	180
M	55.63	112.1	.01798	200
N	50.57	101.9	.01977	220
O	46.36	93.45	.02157	240
P	42.79	86.26	.02337	260
Q	39.73	80.10	.02517	280
R	37.08	74.76	.02697	300
S	34.77	70.09	.02876	320
T	32.72	65.97	.03056	340
U	30.90	62.30	.03236	360
V	29.28	59.02	.03416	380
W	27.81	56.17	.03595	400
X	26.49	53.40	.03775	420
Y	25.28	50.97	.03955	440
Z	24.19	48.76	.04135	460
AA	23.18	46.73	.04315	480
BB	22.25	44.86	.04494	500
CC	12.90	26	.07754	862.6
DD	13.14	26.5	.07608	846.4
EE	13.39	27	.07467	830.7
FF	13.64	27.5	.07331	815.6
GG	13.89	28	.07200	801.0
HH	14.14	28.5	.07074	787.0
II	14.38	29	.06952	773.4

*Density, gm/cm^3 = density, Amagat x 8.9886×10^{-5}

FIGURE 1. Compressibility factor for normal hydrogen.

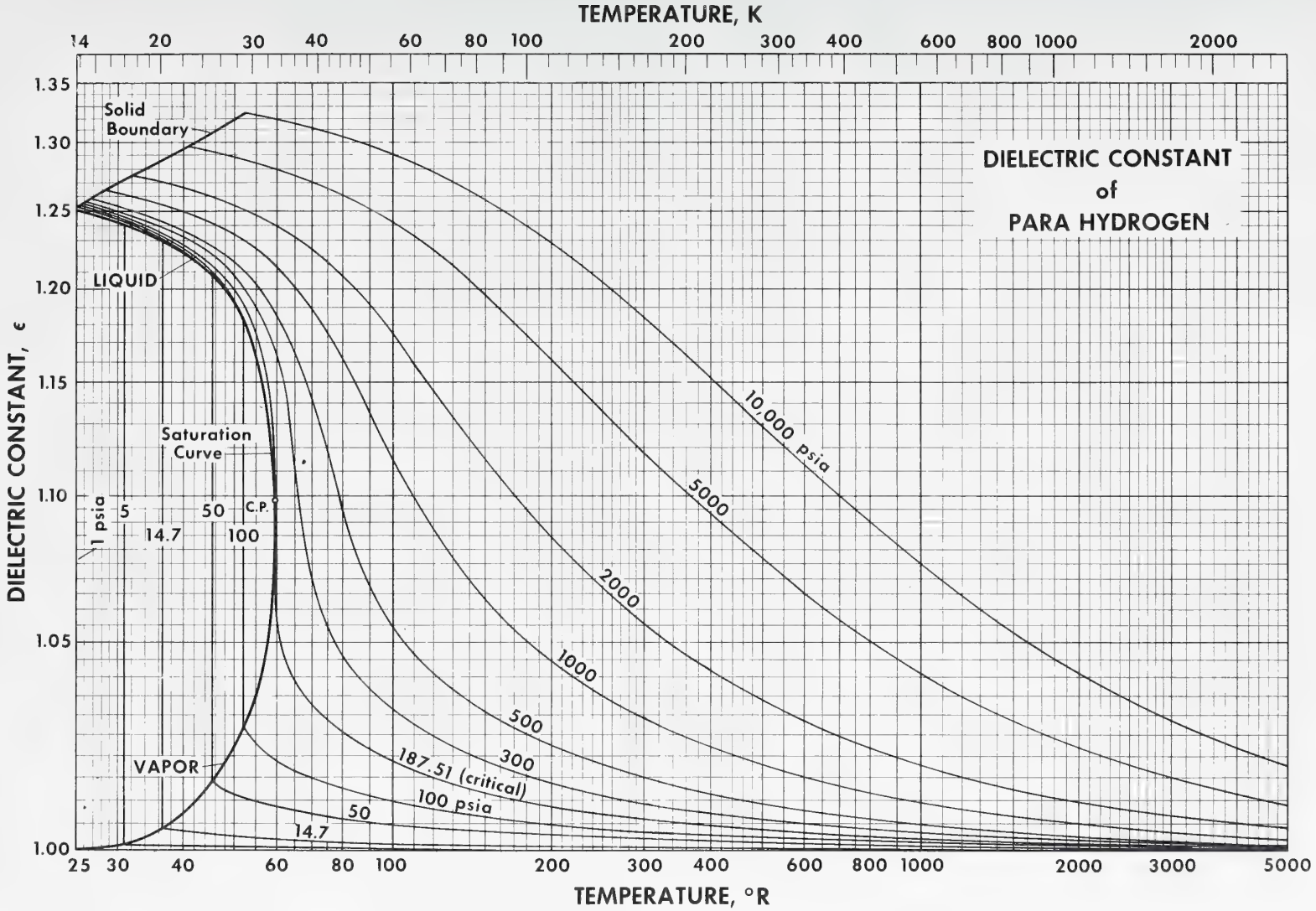


FIGURE 2. Dielectric constant of parahydrogen.

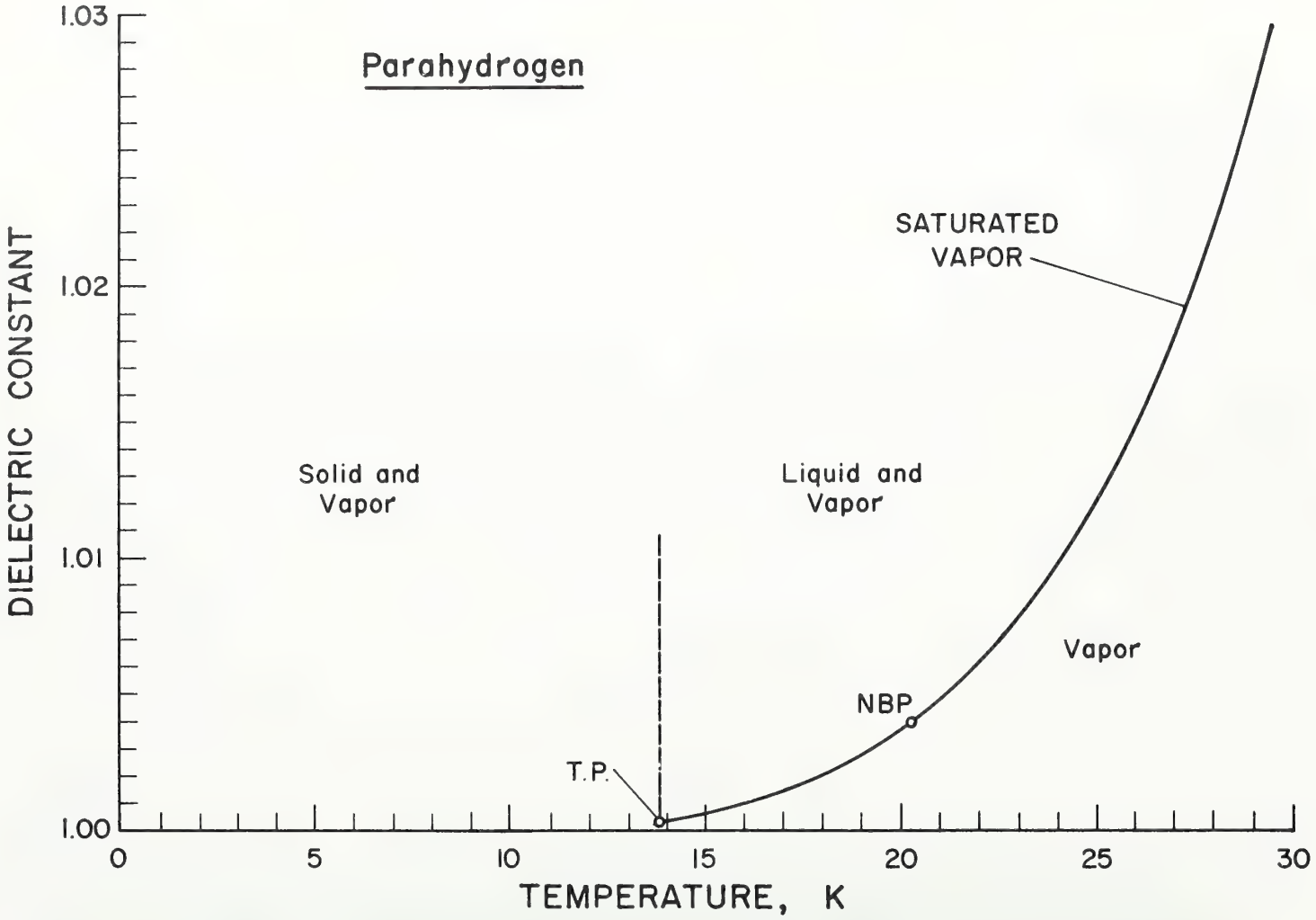


FIGURE 3. Dielectric constant of saturated parahydrogen vapor.

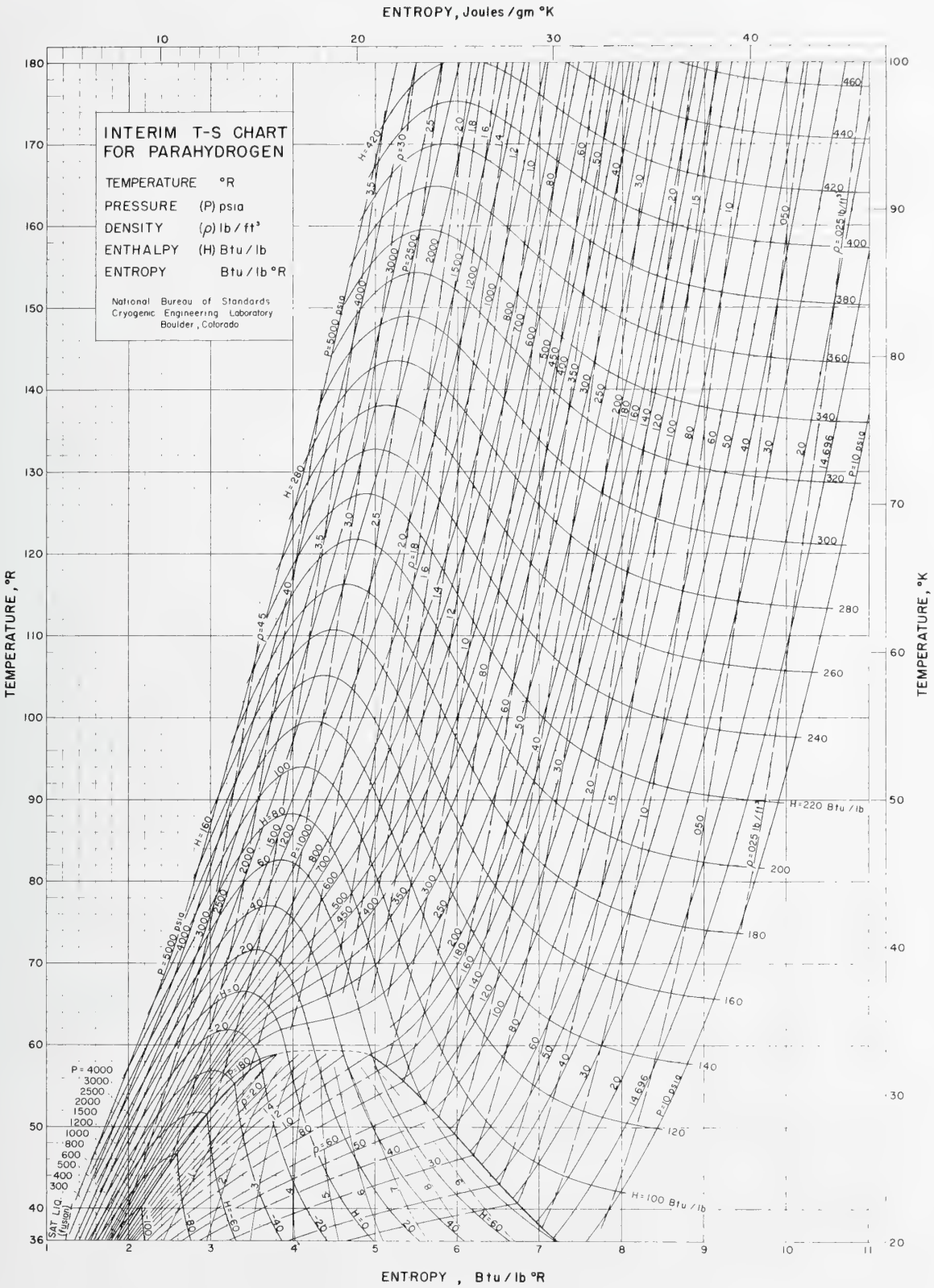


FIGURE 4. Parahydrogen temperature-entropy chart (20 to 100 K).

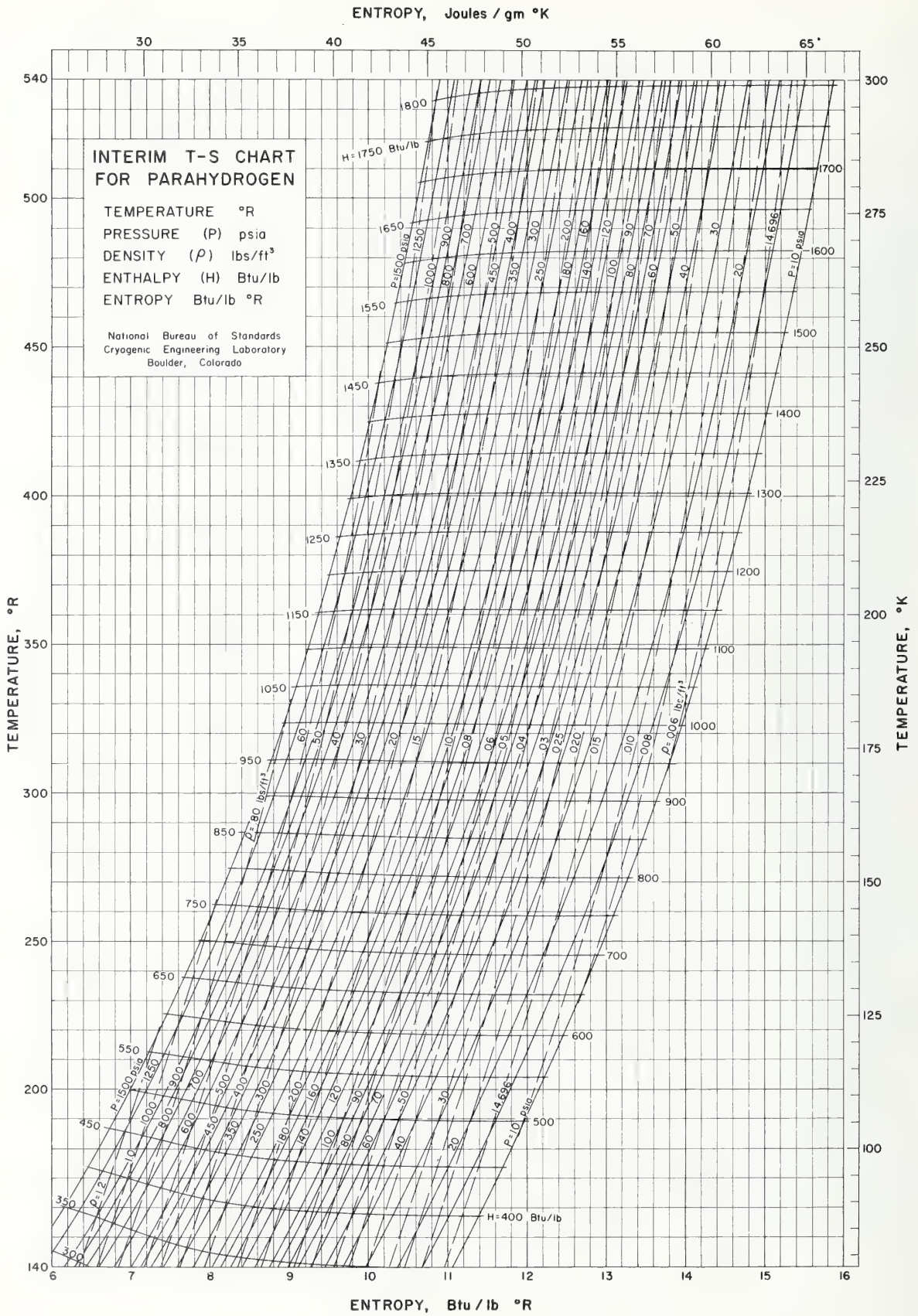


FIGURE 5. Parahydrogen temperature-entropy chart (80 to 300 K).

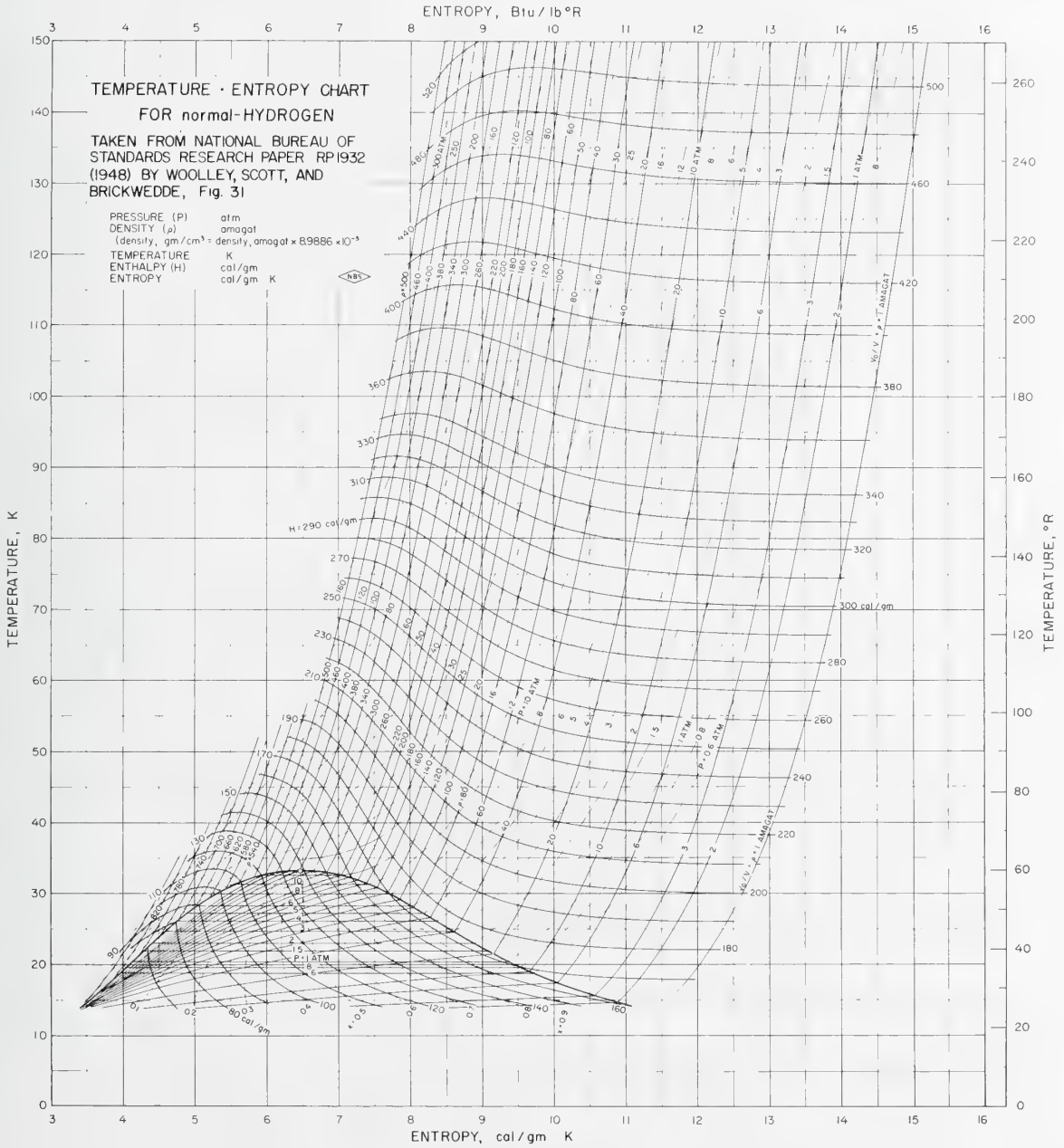


FIGURE 6. Normal hydrogen temperature-entropy chart (15 to 150 K).

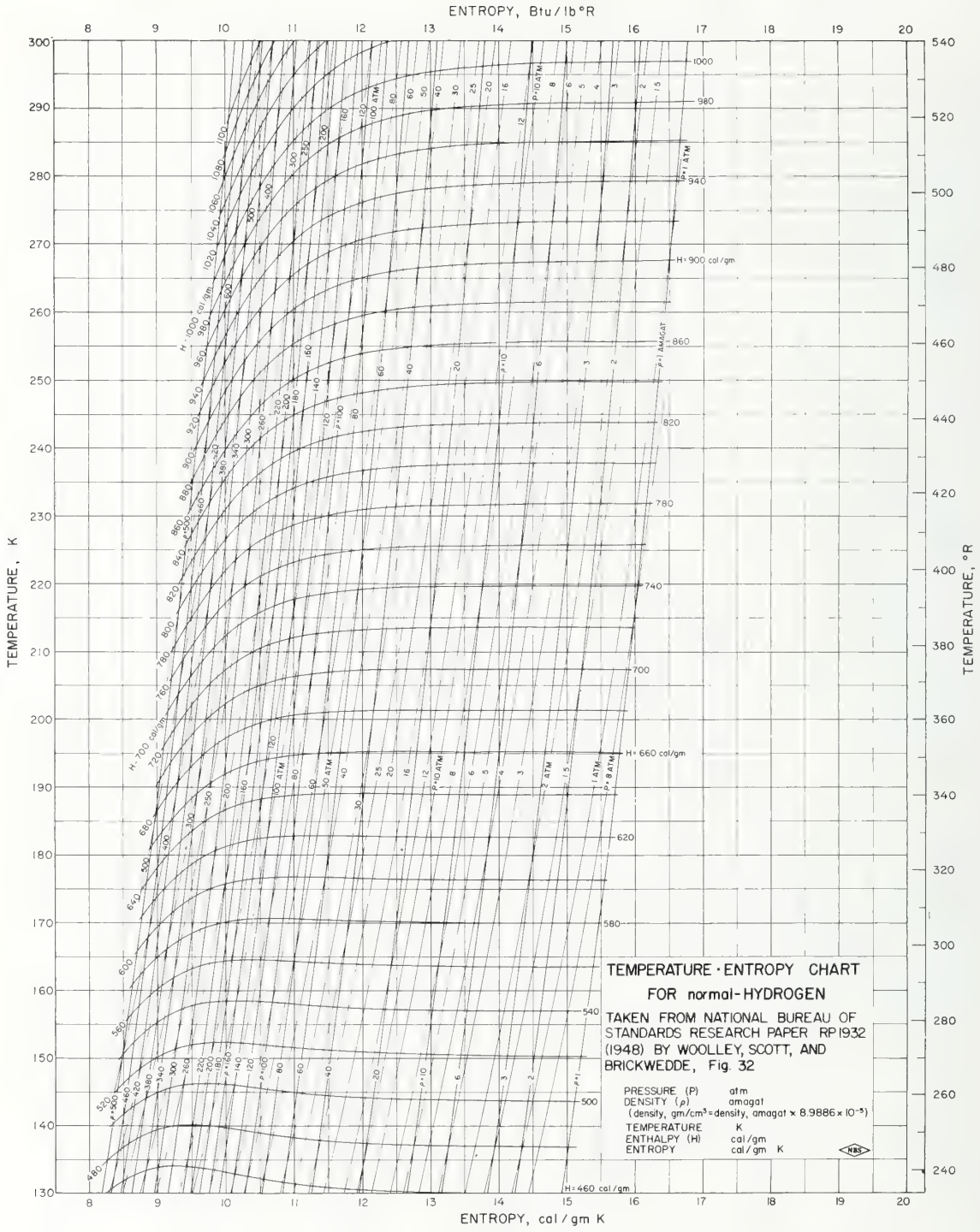


FIGURE 7. Normal hydrogen temperature-entropy chart (130 to 300 K).

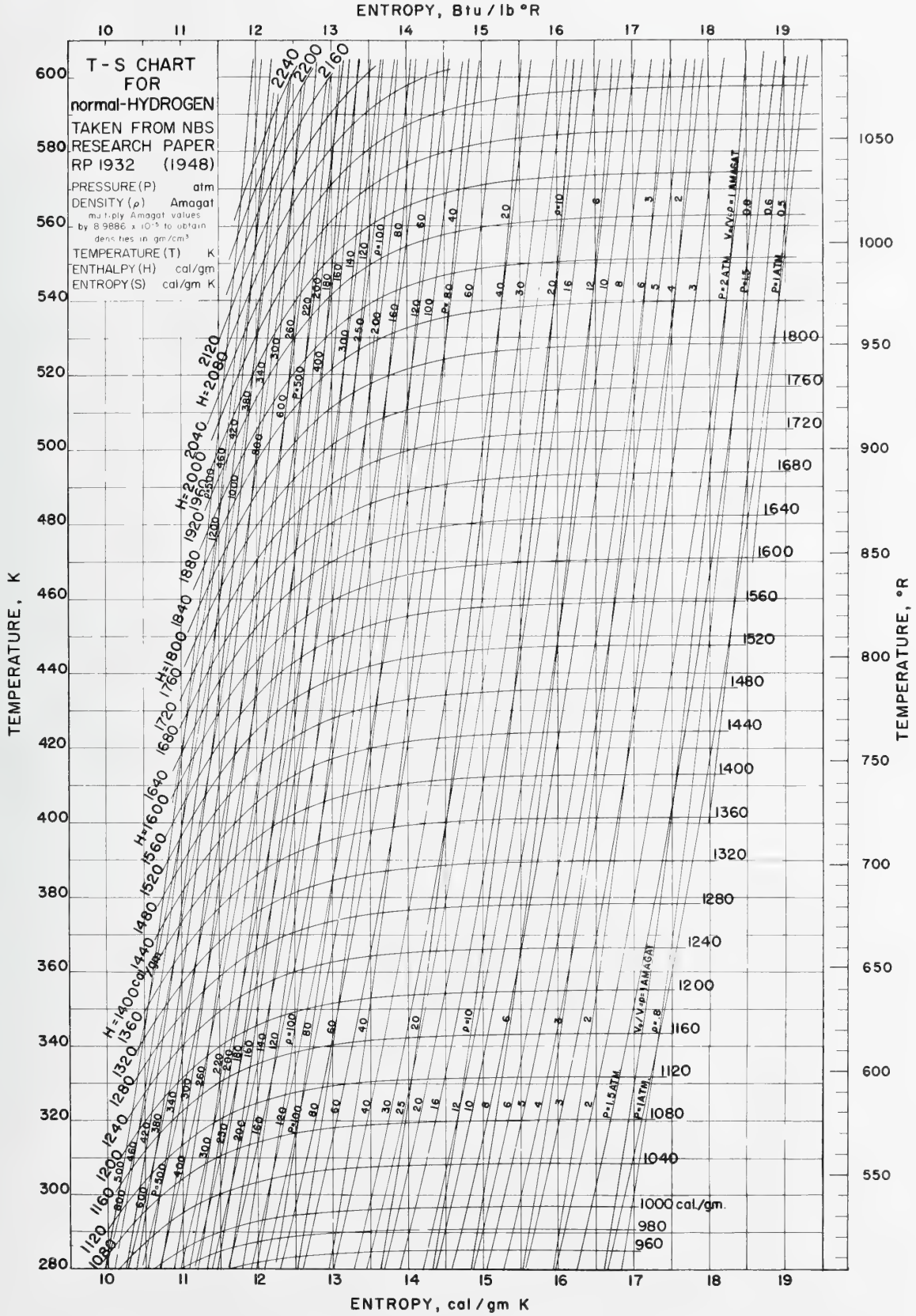


FIGURE 8. Normal hydrogen temperature-entropy chart (280 to 600 K).

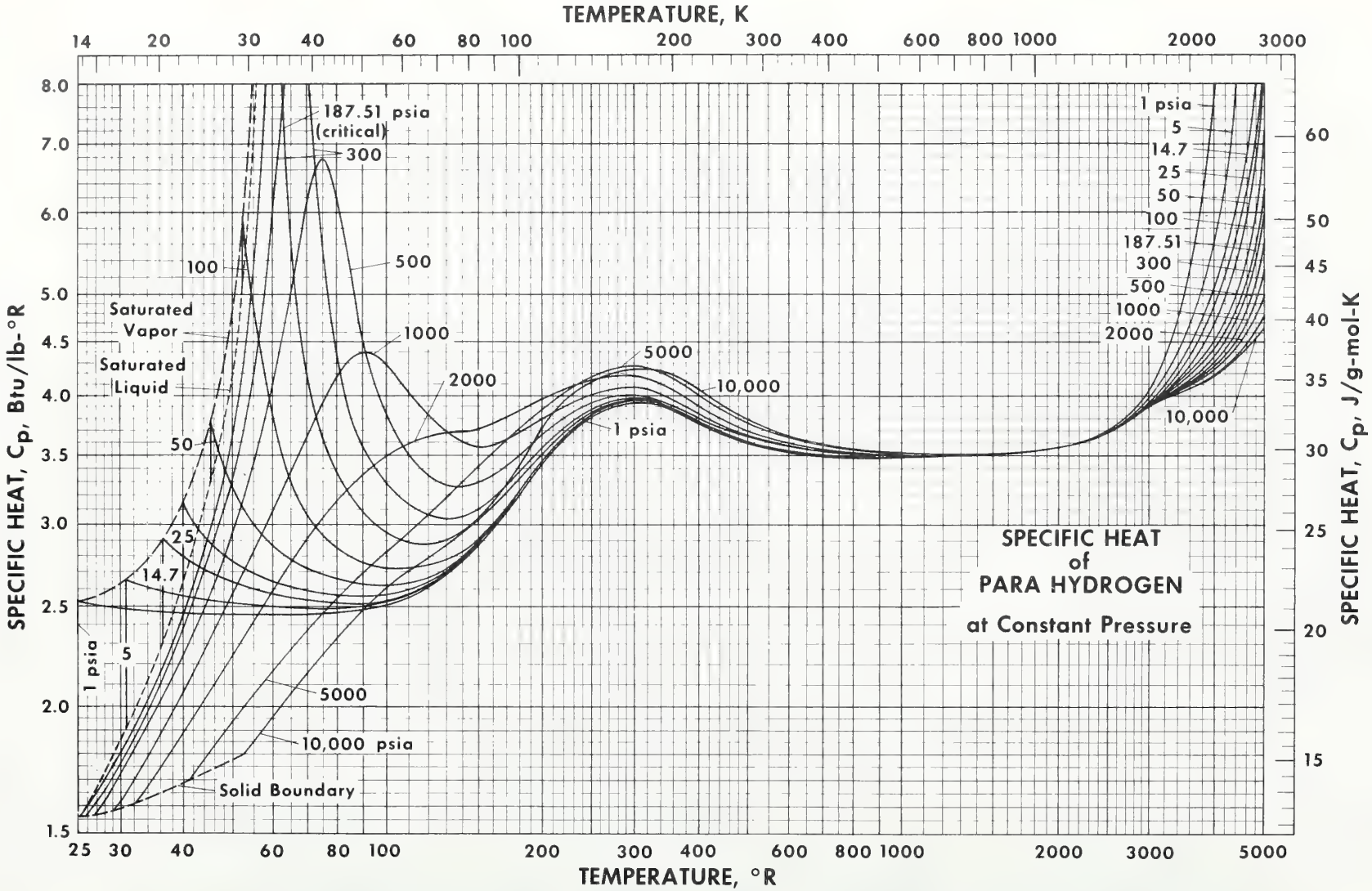


FIGURE 9. Specific heat (heat capacity) of parahydrogen at constant pressure.

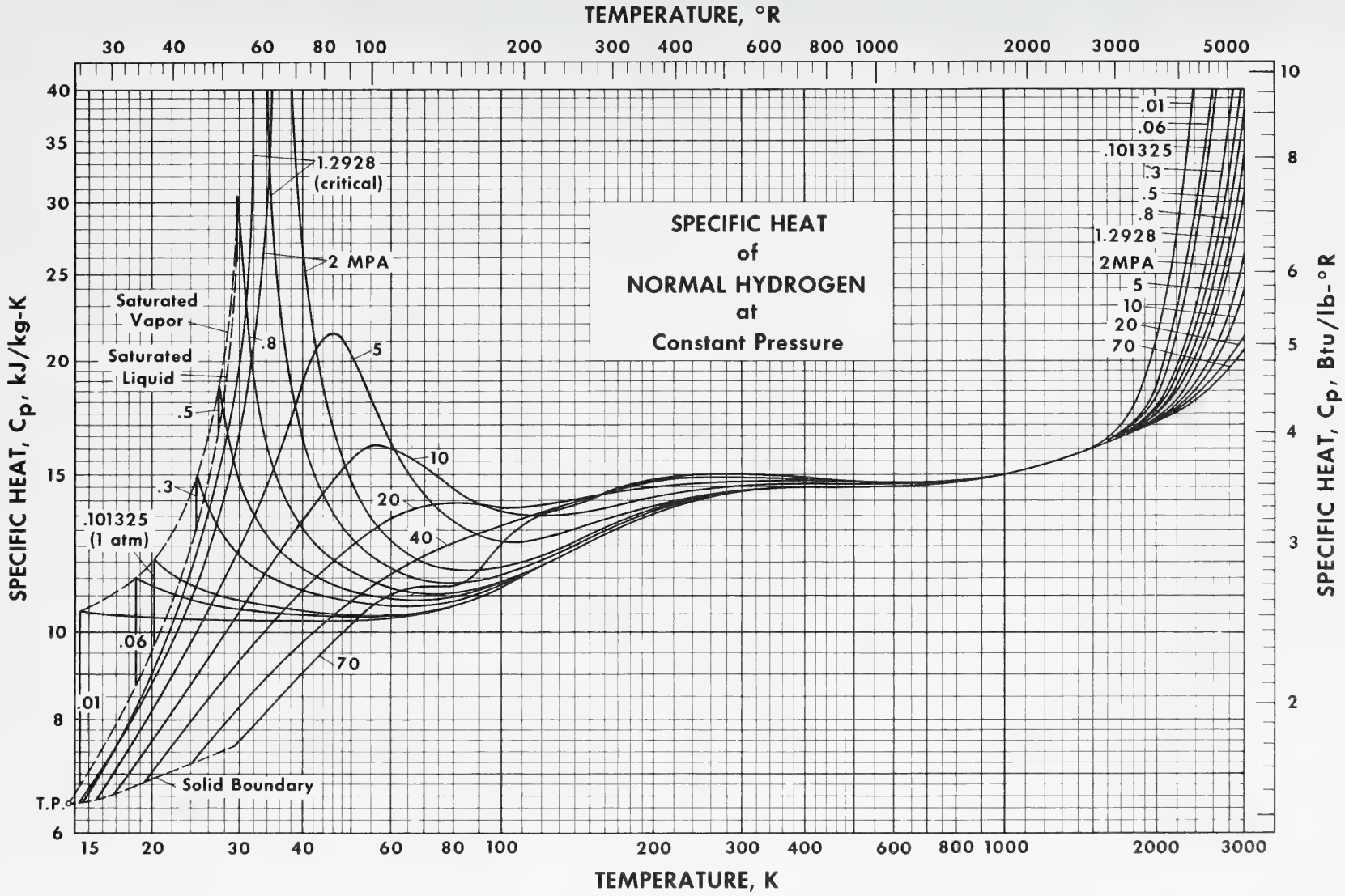


FIGURE 10. Specific heat (heat capacity) of normal hydrogen at constant pressure.

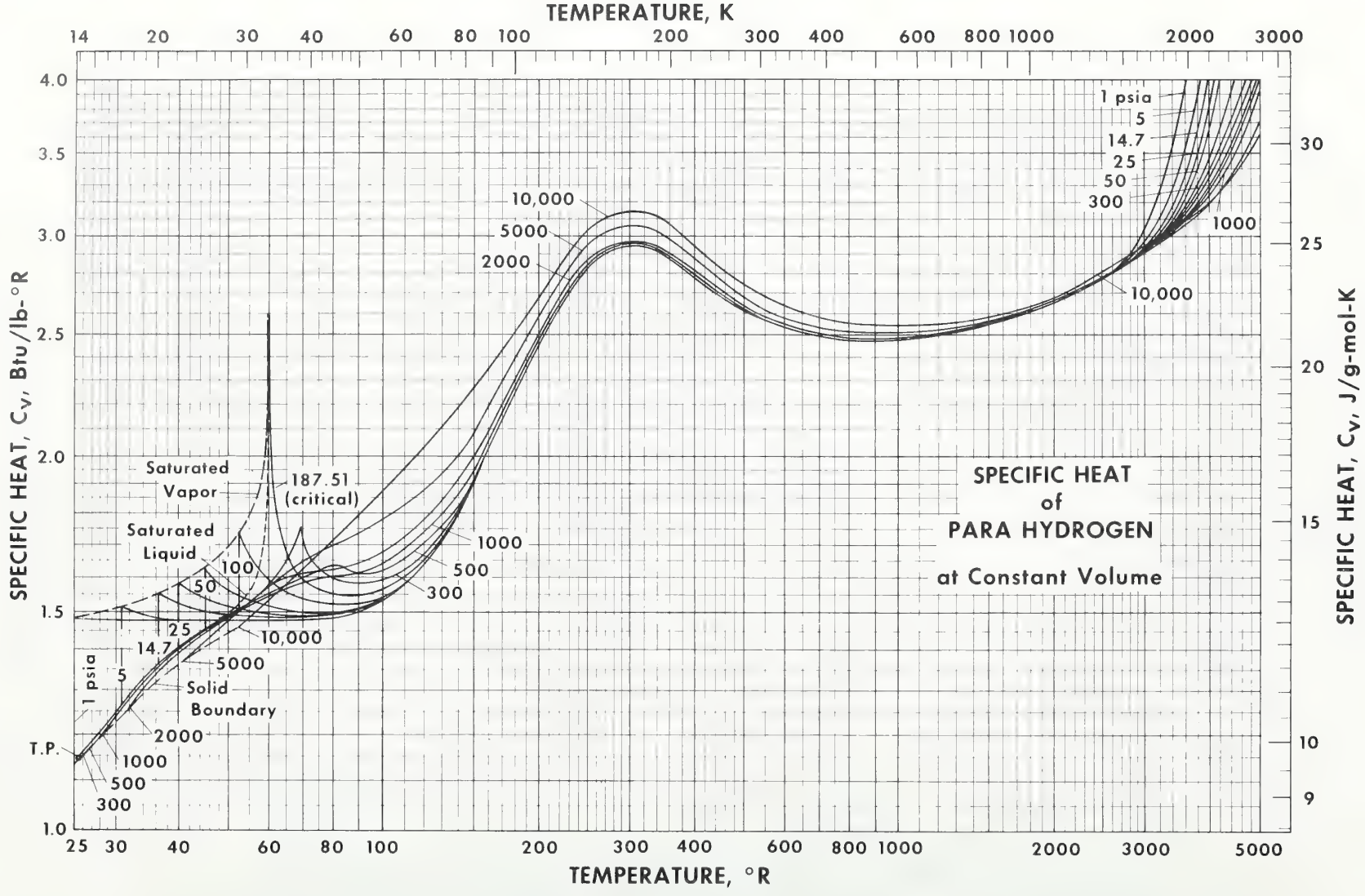


FIGURE 11. Specific heat (heat capacity) of parahydrogen at constant volume.

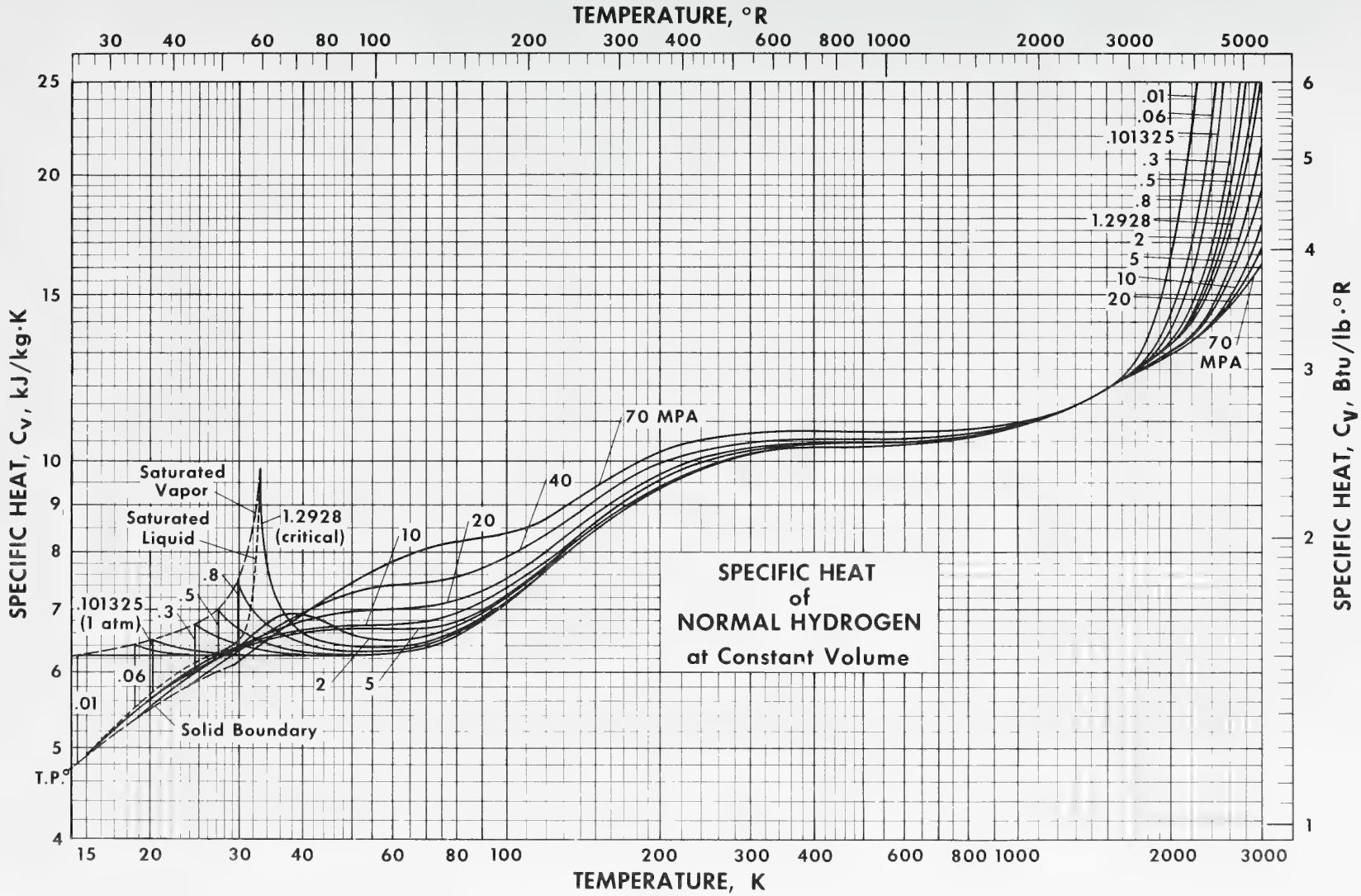


FIGURE 12. Specific heat (heat capacity) of normal hydrogen at constant volume.

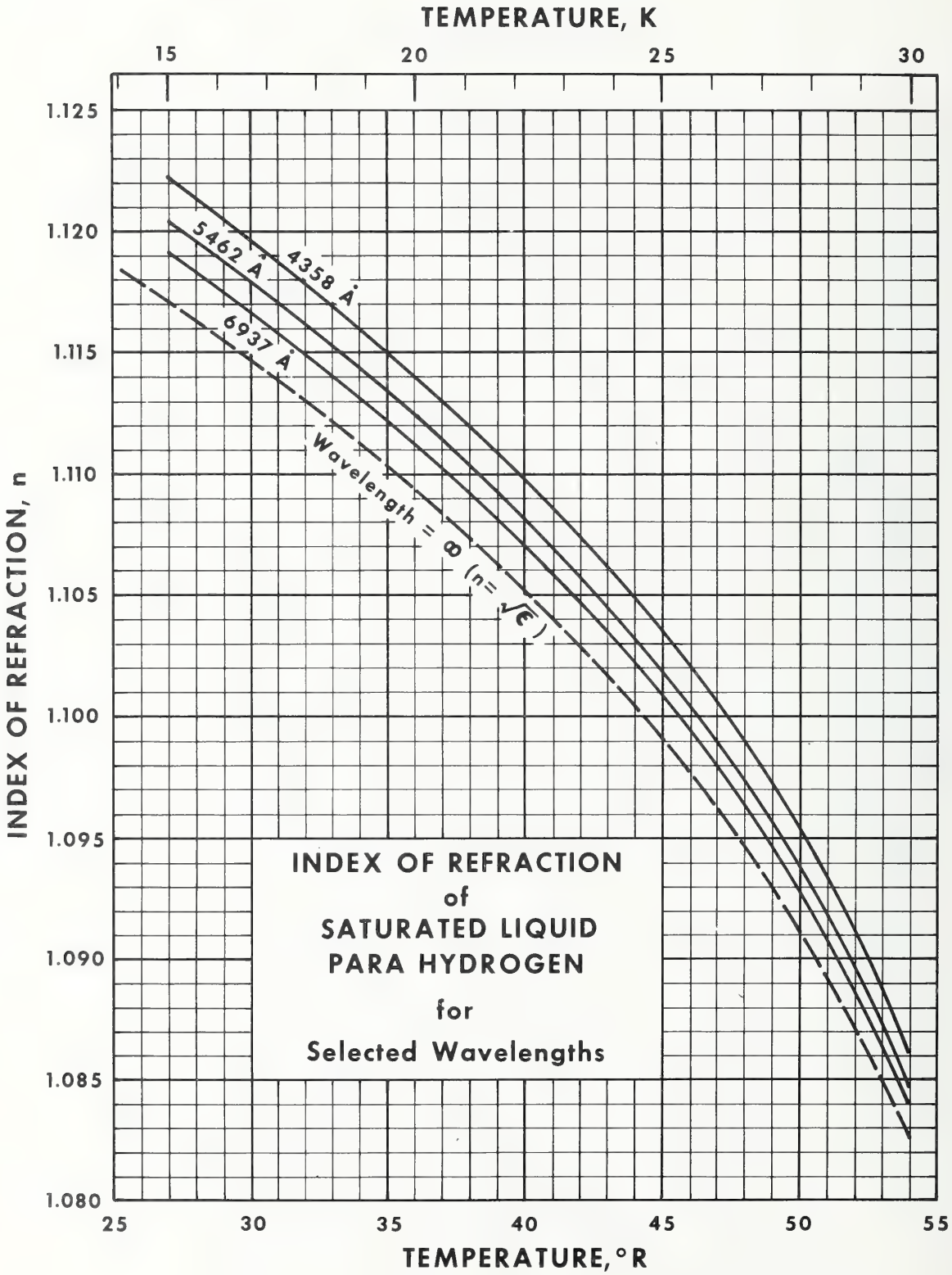


FIGURE 13. Index of refraction of saturated liquid parahydrogen.

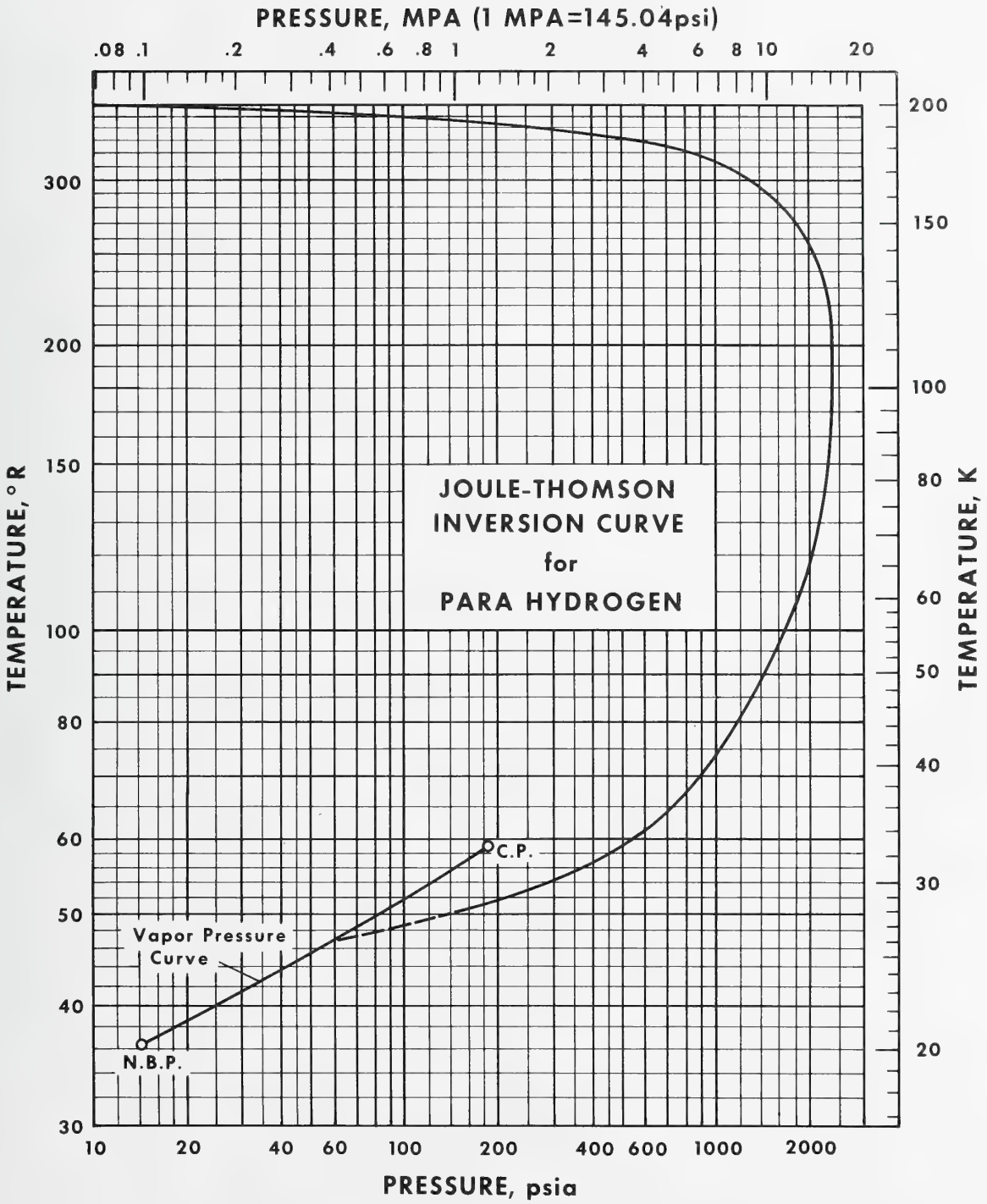


Figure 14. Joule-Thomson inversion curve for parahydrogen.

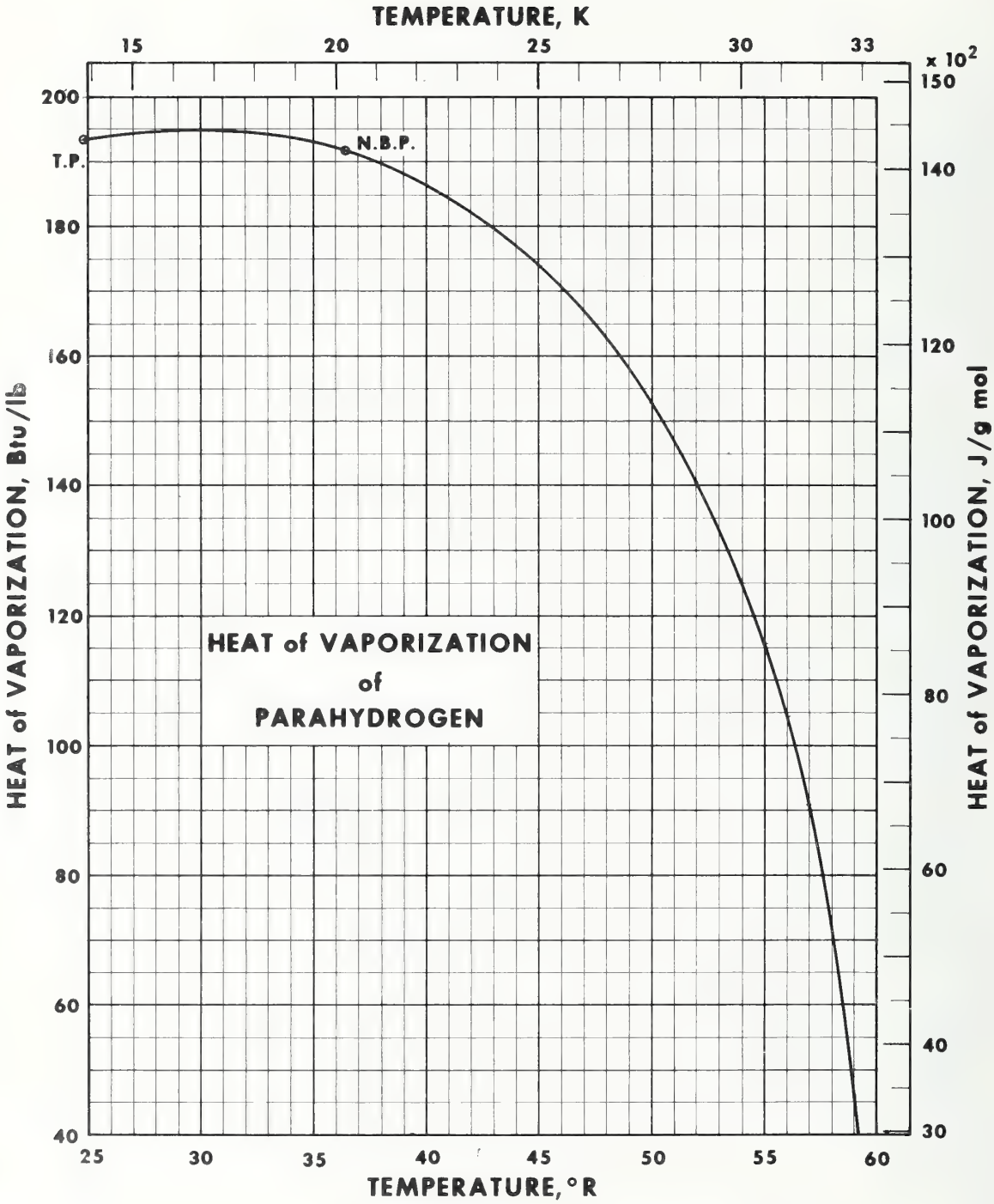


FIGURE 15. Latent heat of vaporization of parahydrogen.

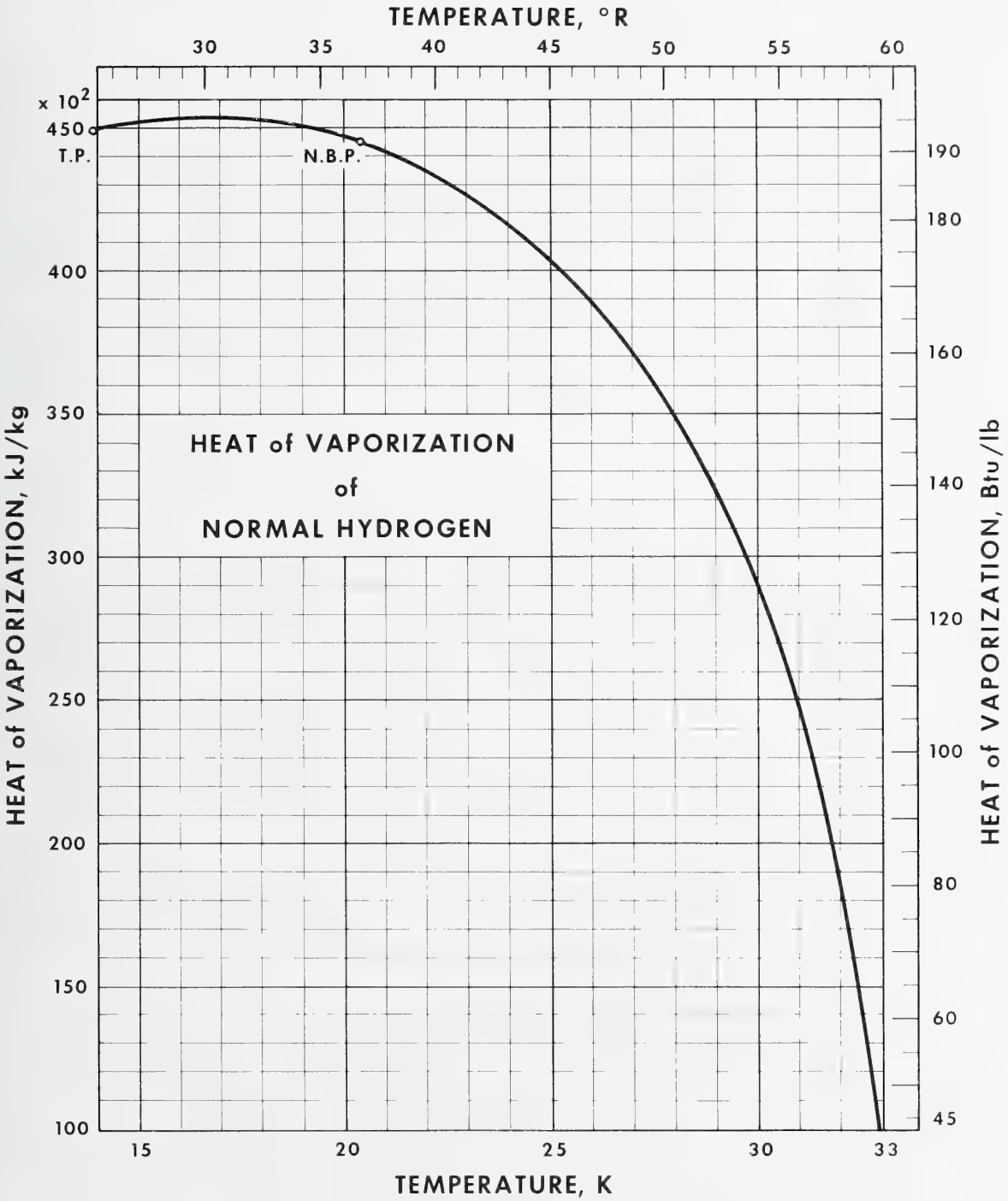


FIGURE 16. Latent heat of vaporization of normal hydrogen.

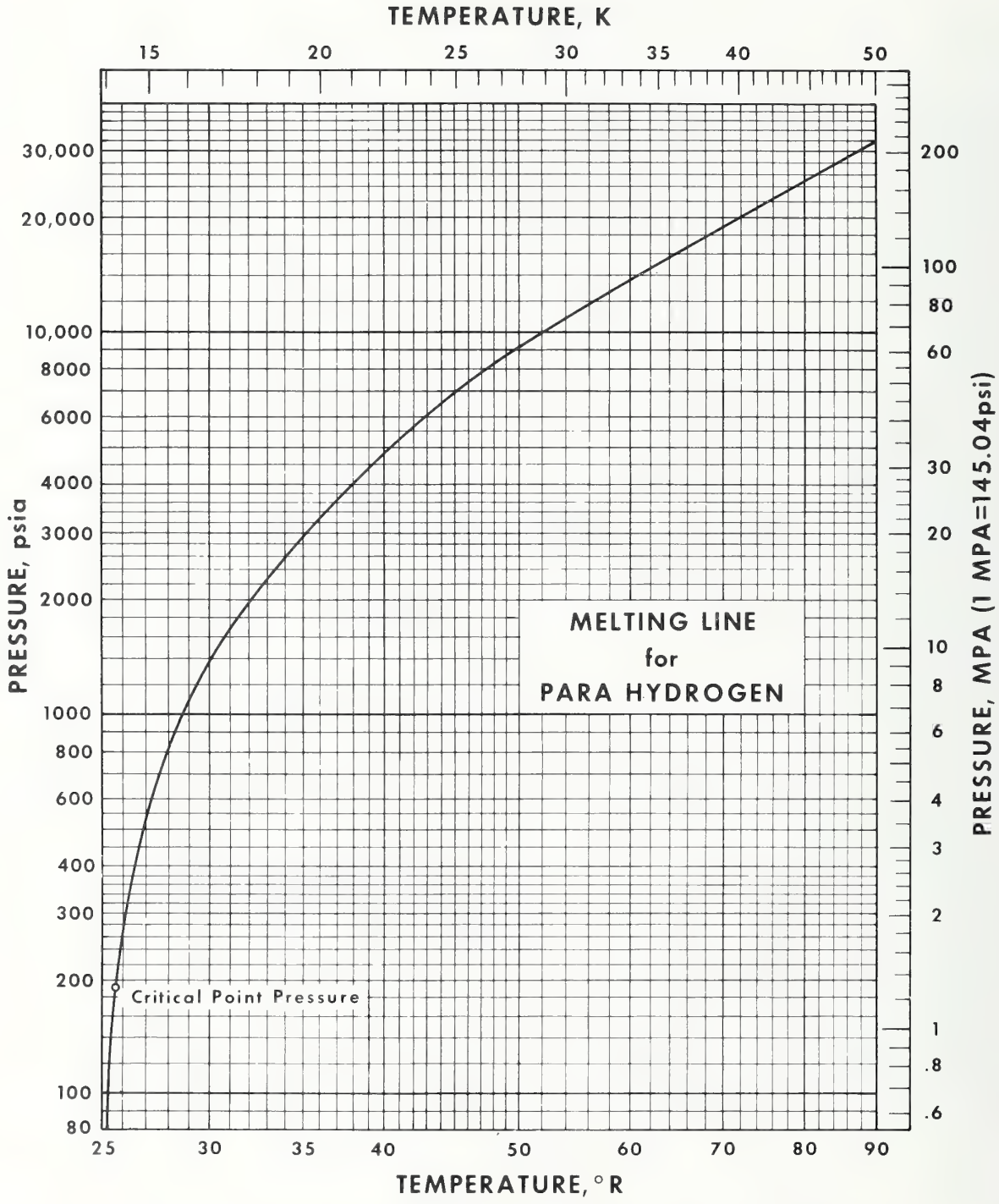


FIGURE 17. Melting line for parahydrogen (0.6 to 200 MPa).

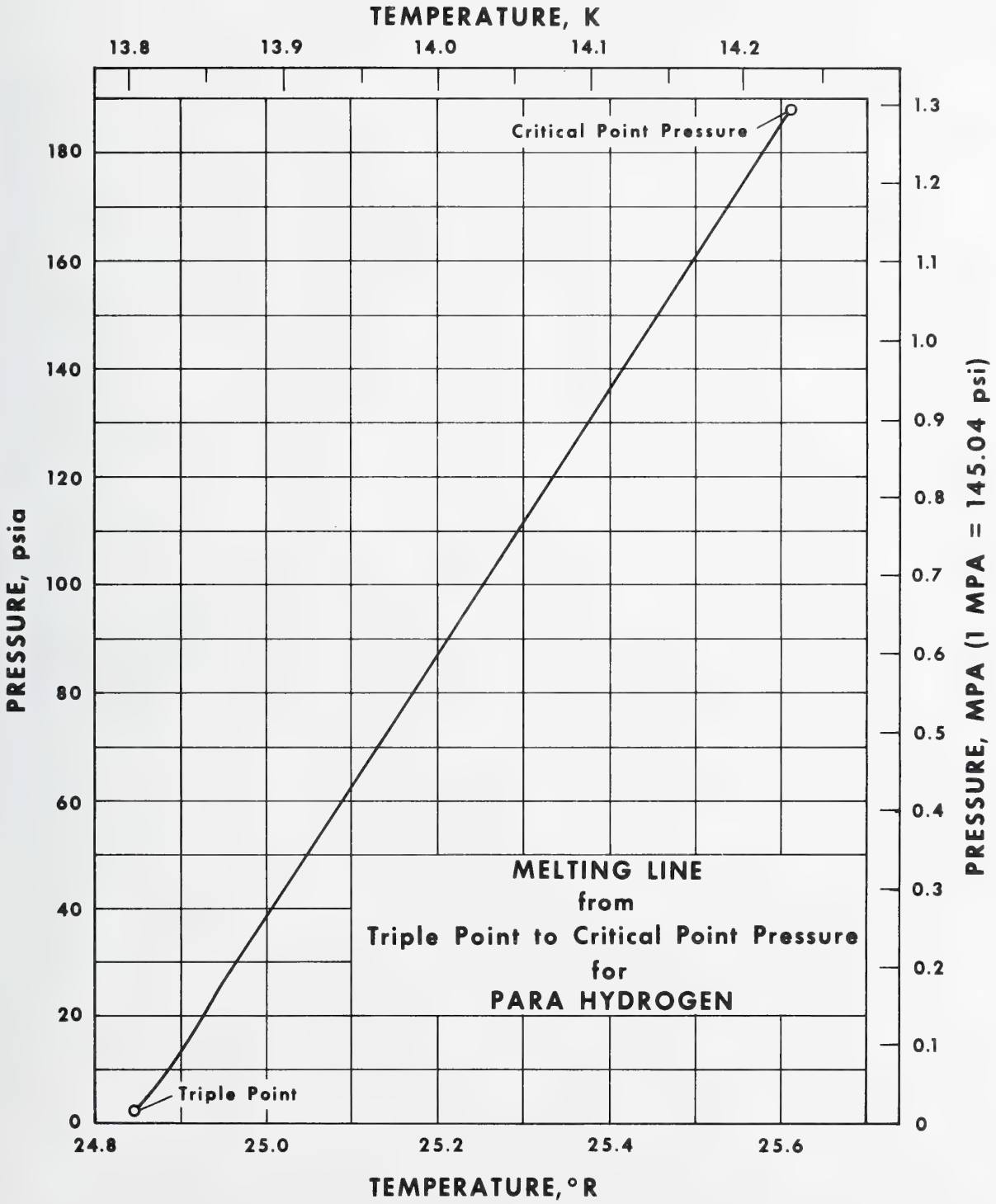


FIGURE 18. Melting line from triple point to critical point pressure for parahydrogen.

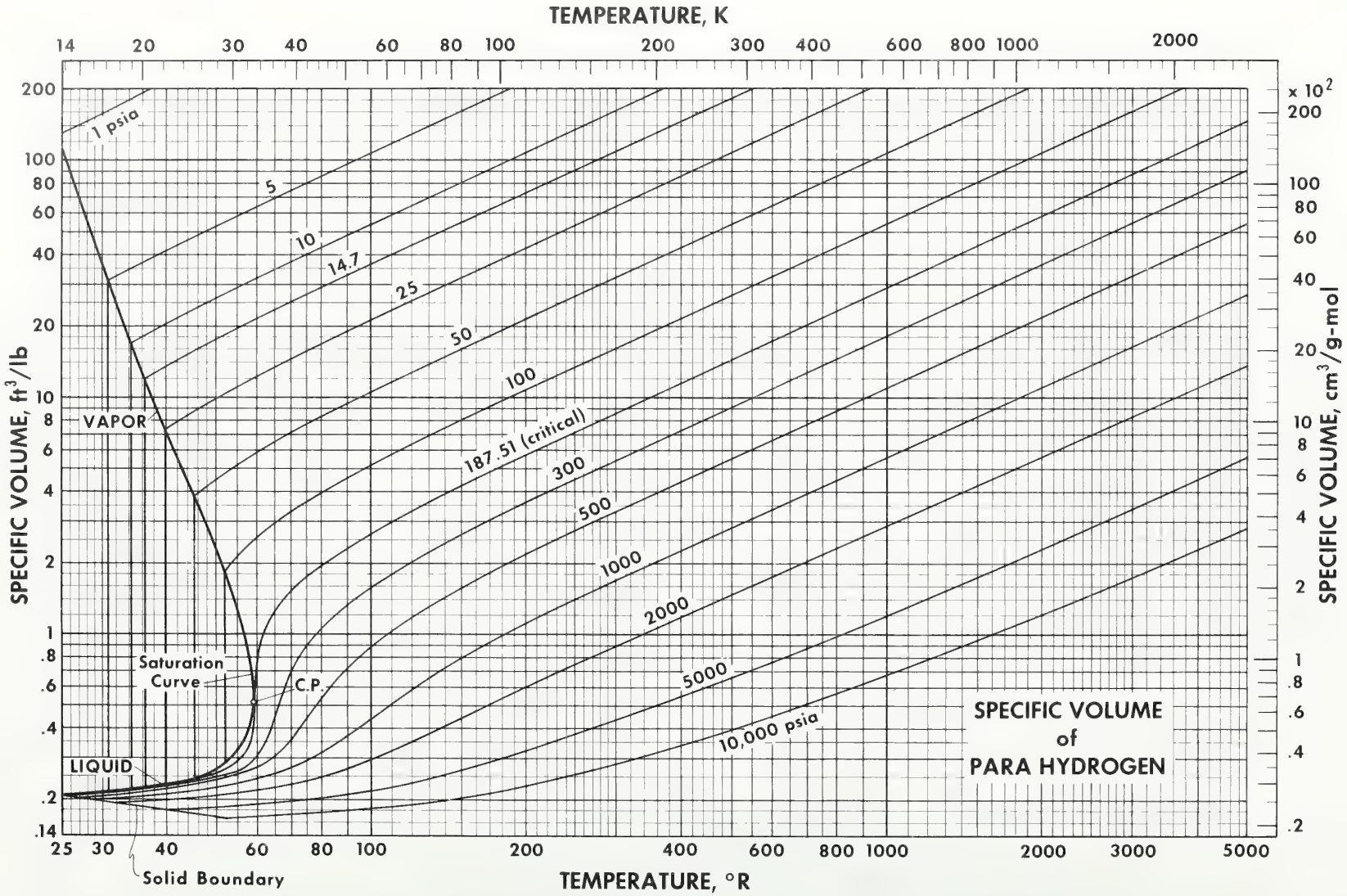


FIGURE 19. Specific volume (PVT) of parahydrogen.

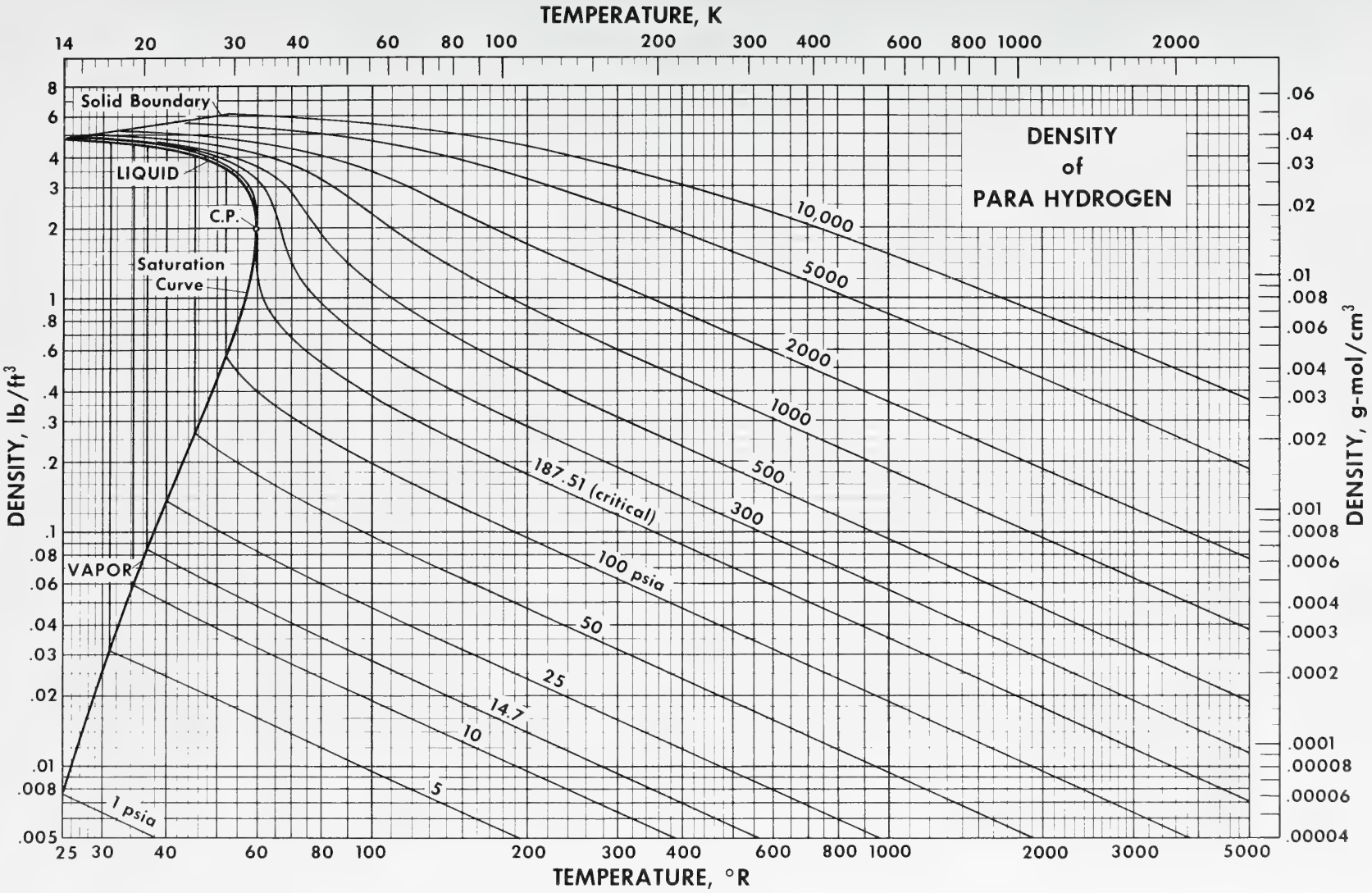


FIGURE 20. Density (P-ρ-T) of parahydrogen.

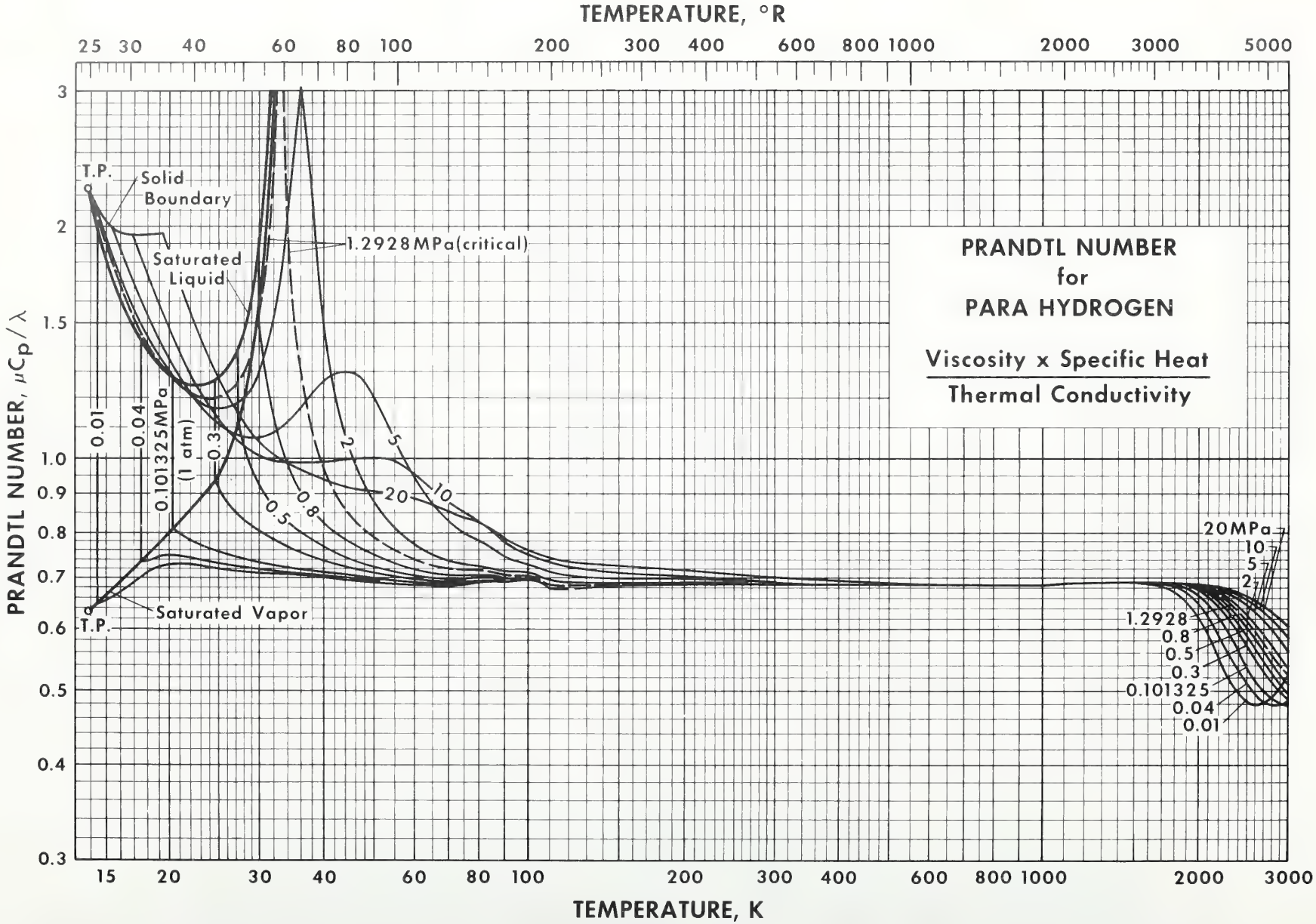


FIGURE 21. Prandtl number for parahydrogen.

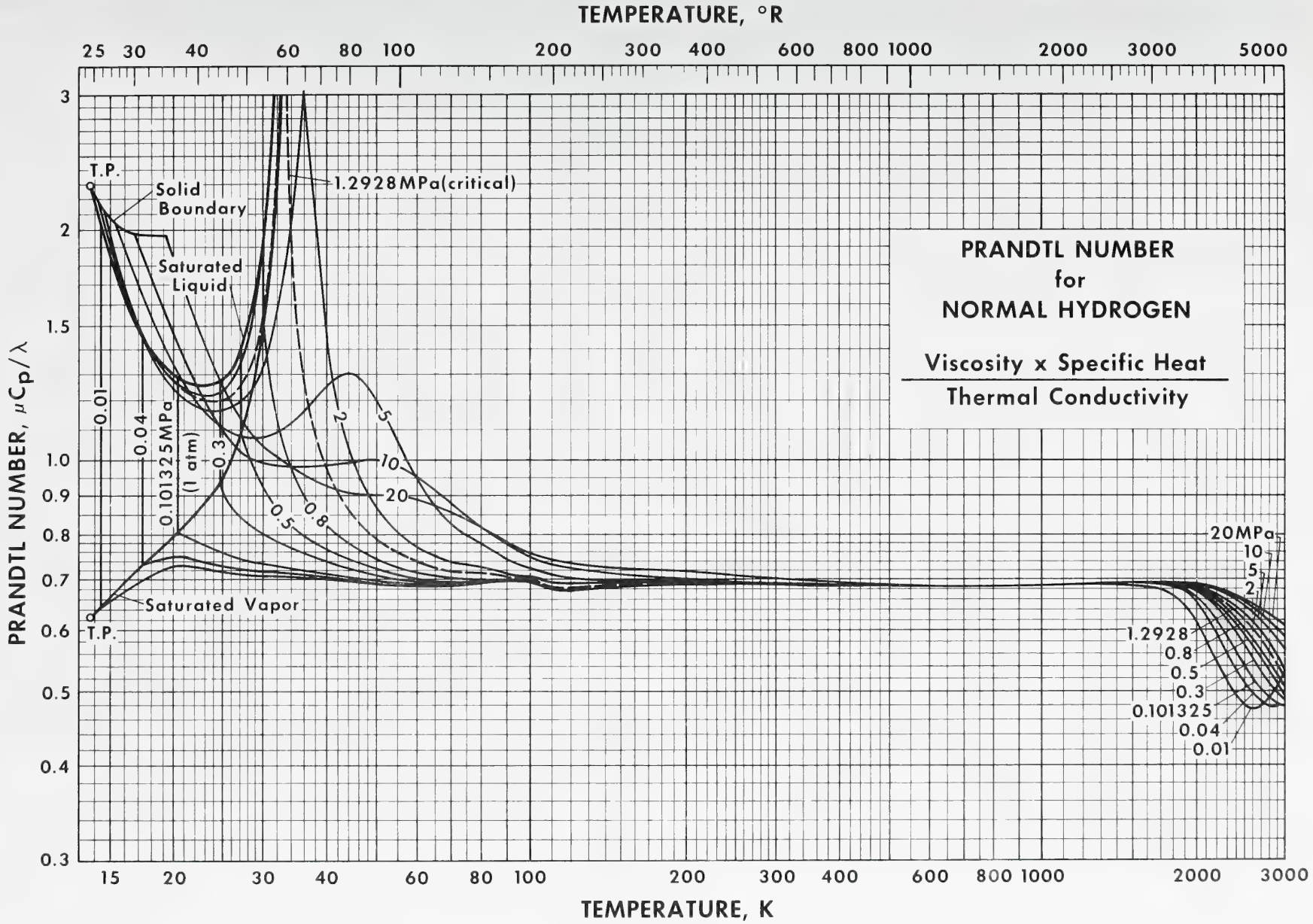


FIGURE 22. Prandtl number for normal hydrogen.

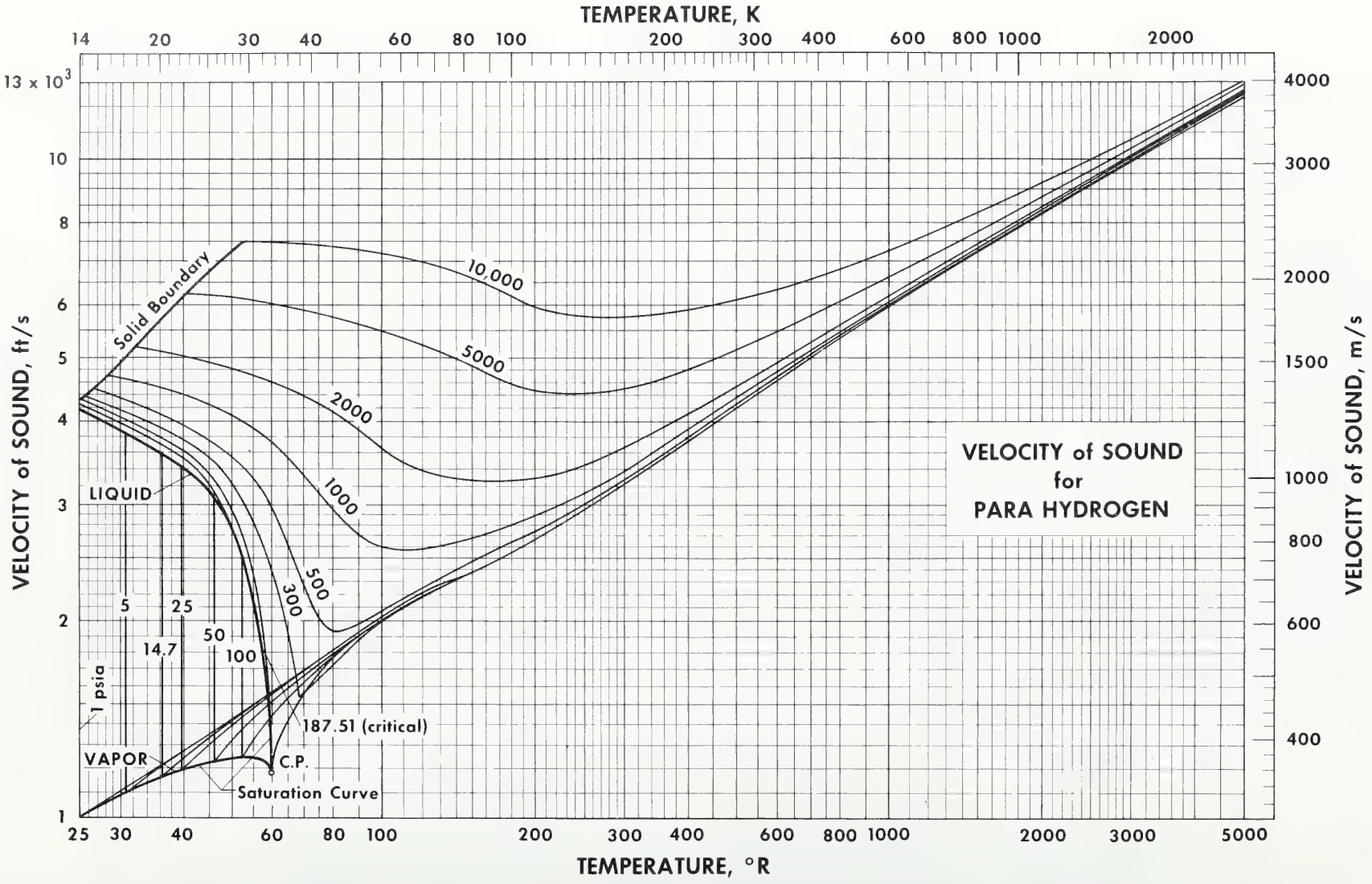


FIGURE 23. Velocity of sound for parahydrogen.

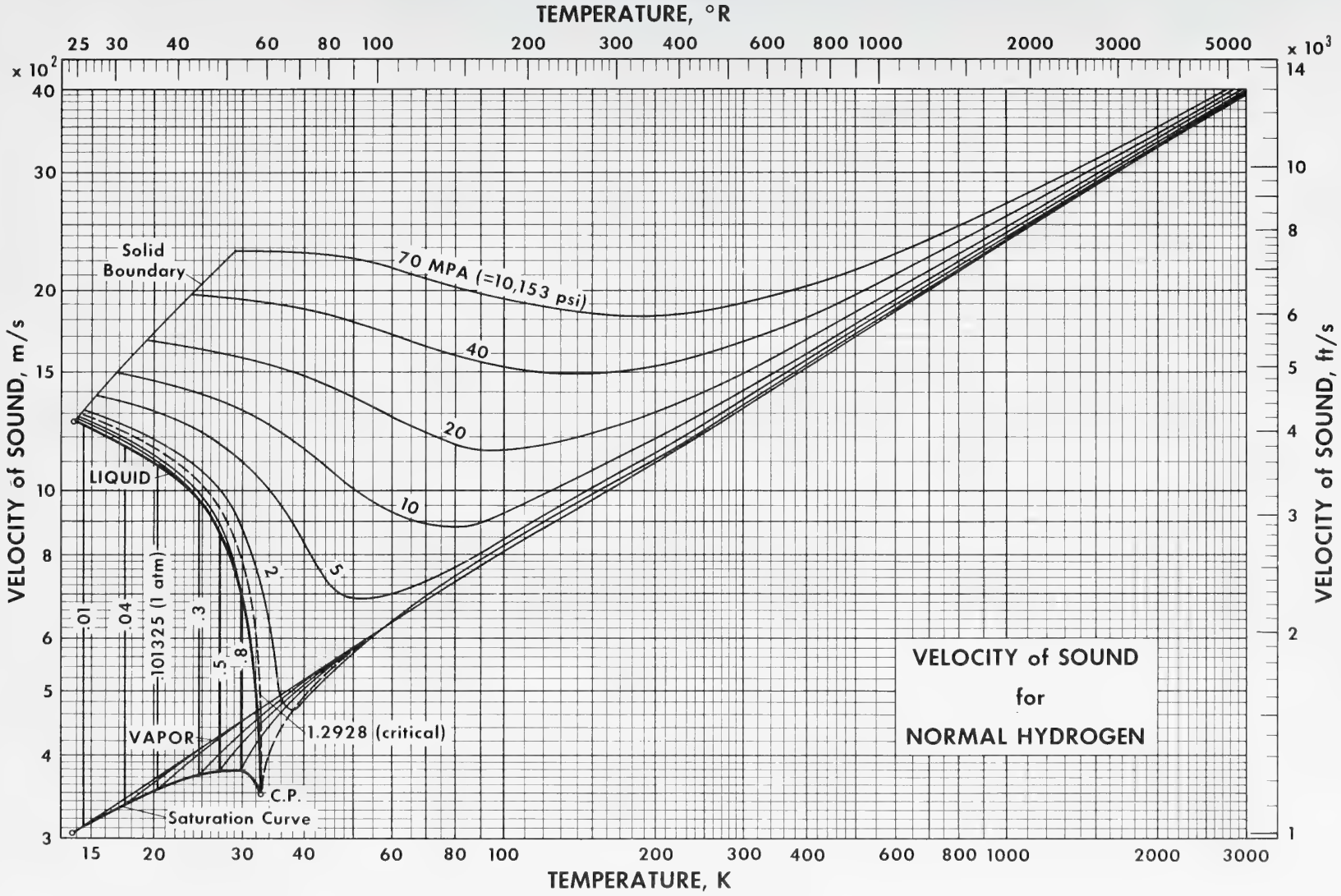


FIGURE 24. Velocity of sound for normal hydrogen.

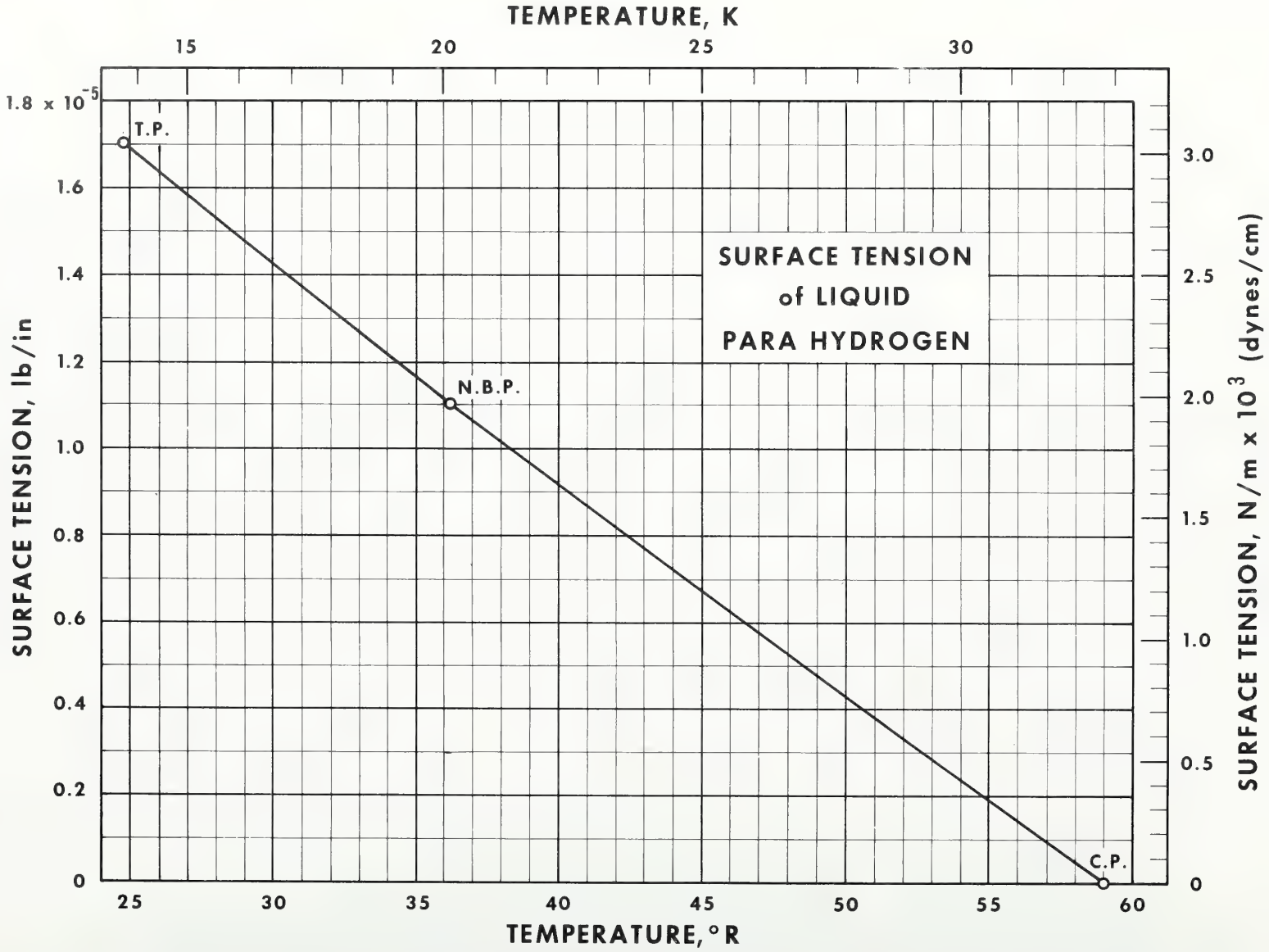


FIGURE 25. Surface tension of liquid parahydrogen.

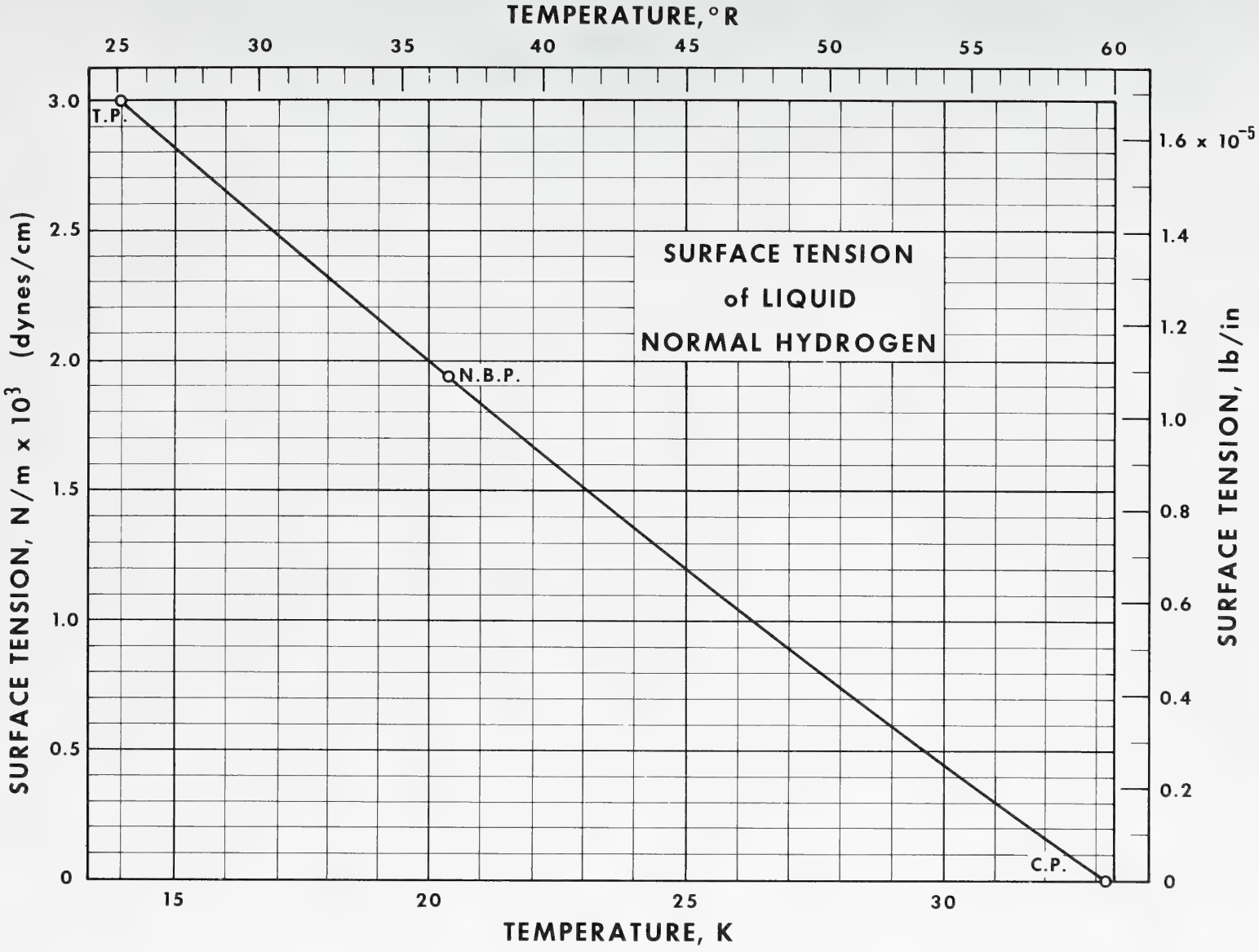


FIGURE 26. Surface tension of liquid normal hydrogen.

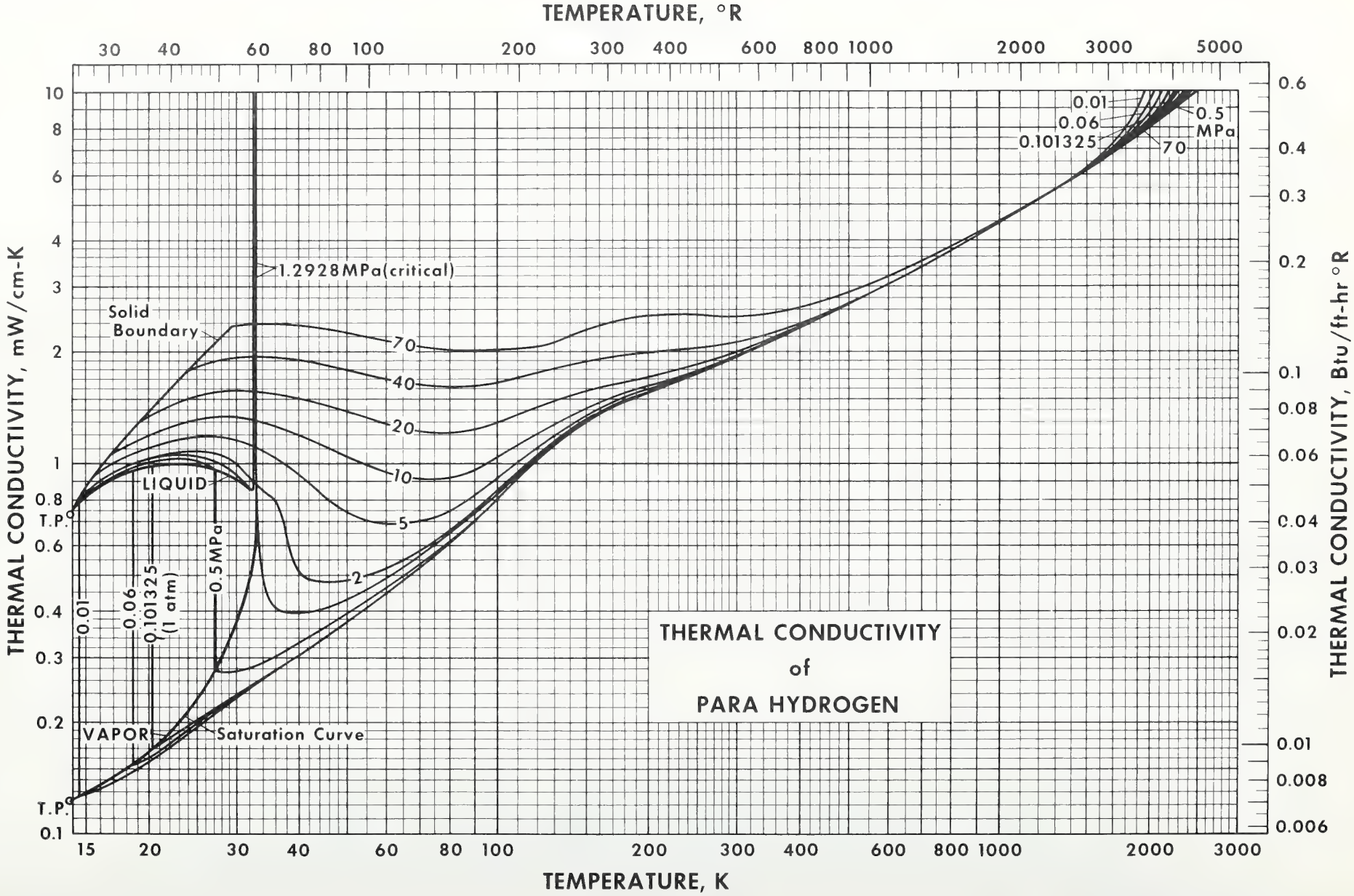


FIGURE 27. Thermal conductivity of parahydrogen.

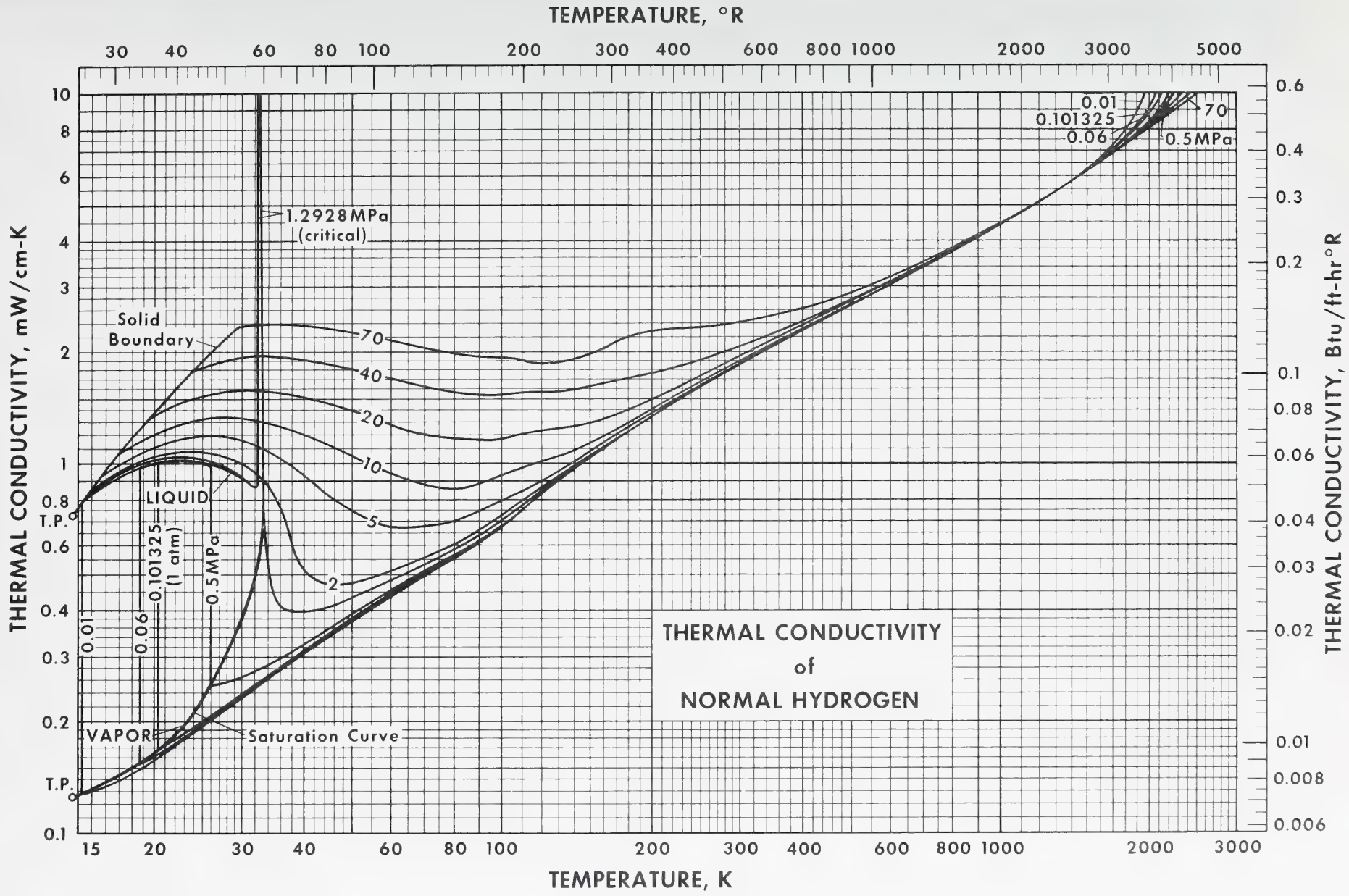


FIGURE 28. Thermal conductivity of normal hydrogen.

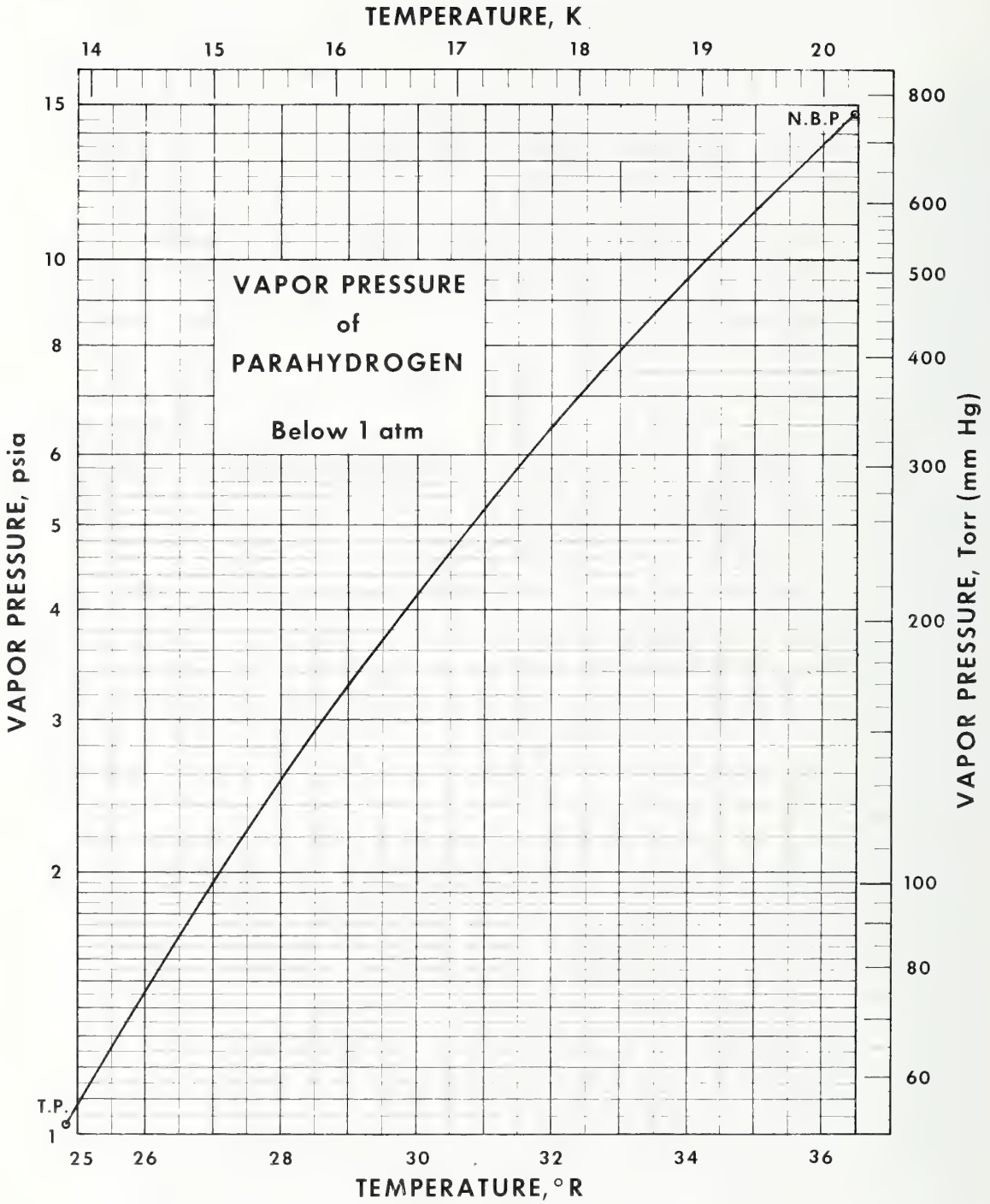


FIGURE 29. Vapor pressure of parahydrogen below 0.101325 MPa (1 atm).

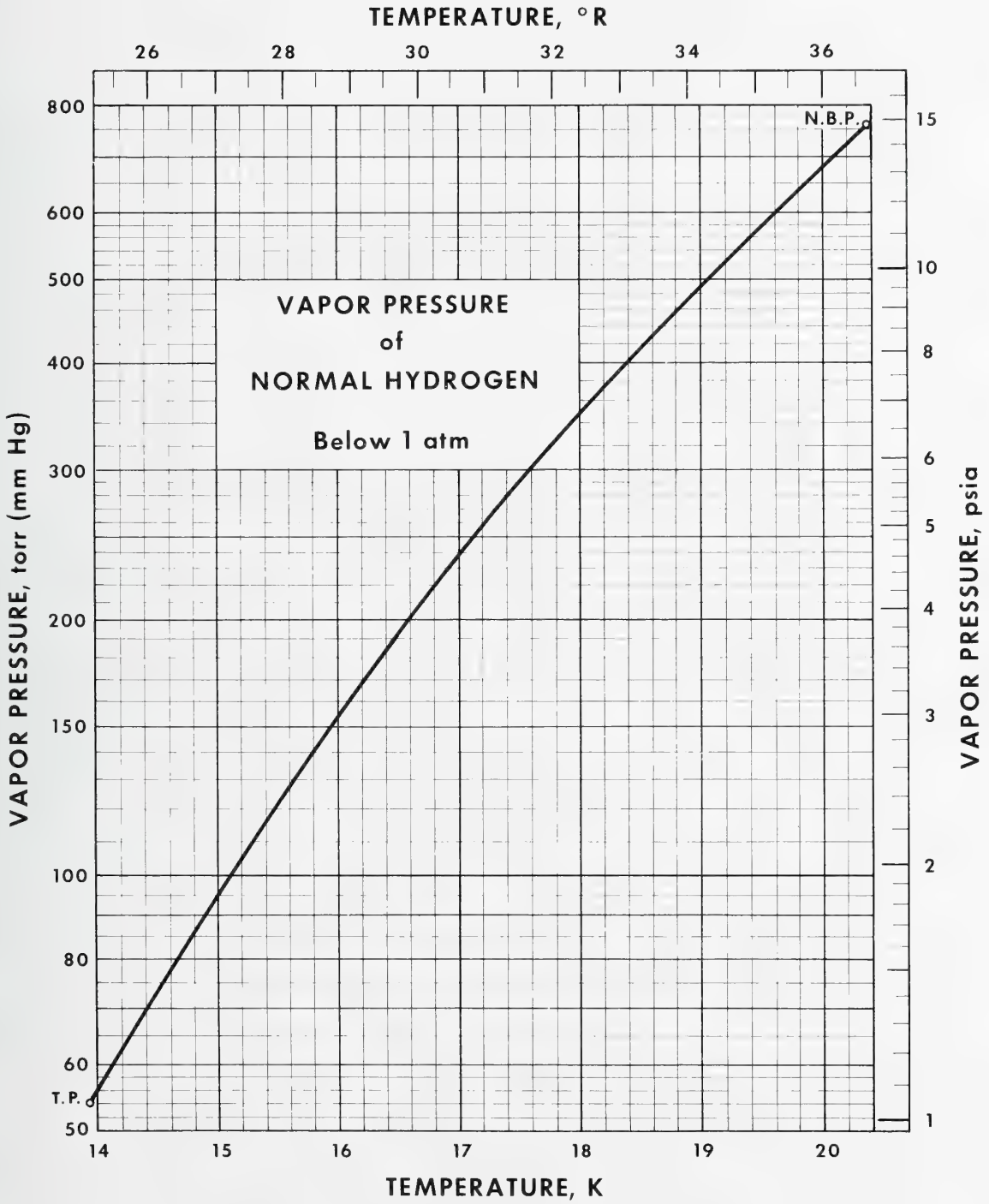


FIGURE 30. Vapor pressure of normal hydrogen below 0.101325 MPa (1 atm).

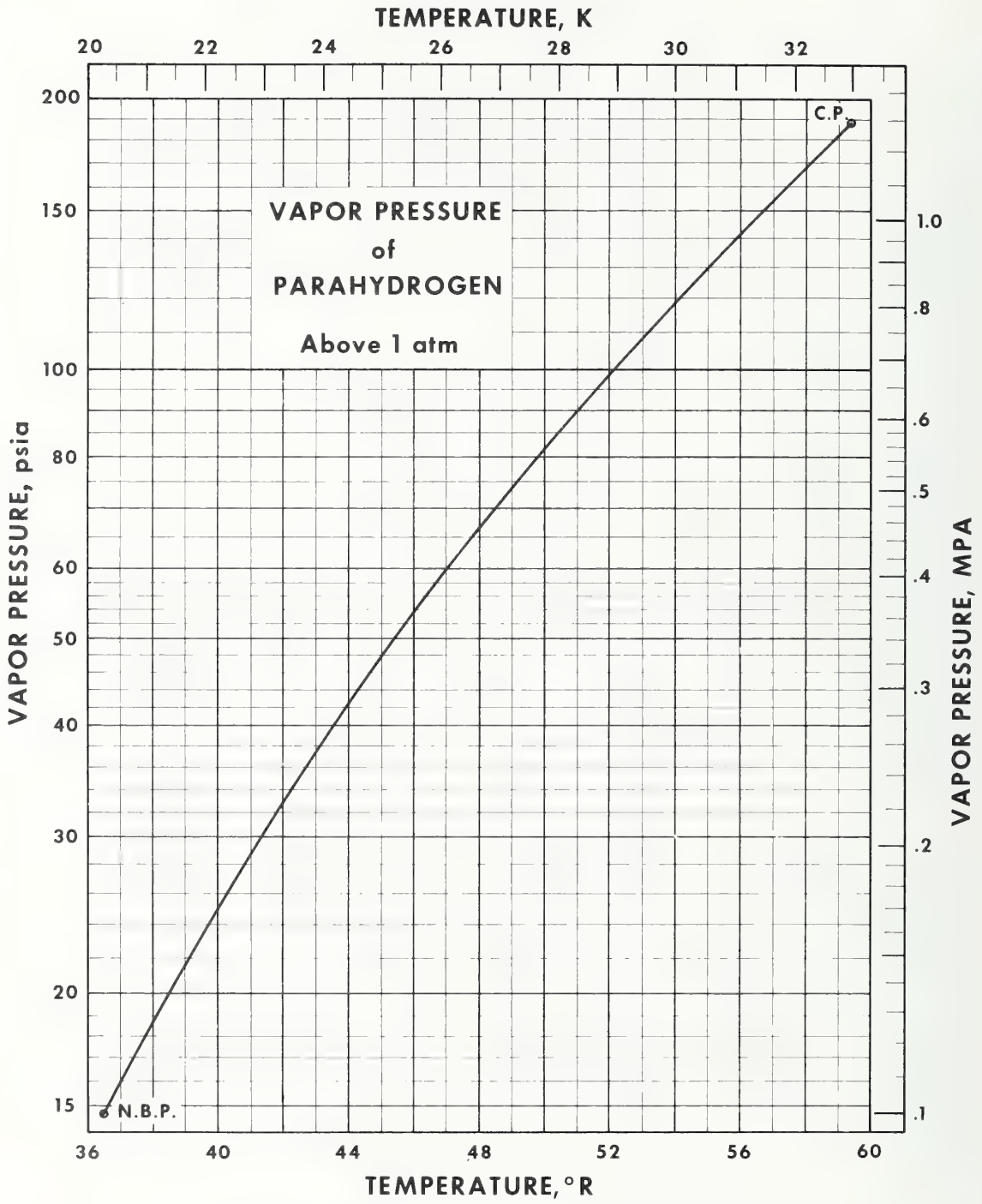


FIGURE 31. Vapor pressure of parahydrogen above 0.101325 MPa (1 atm).

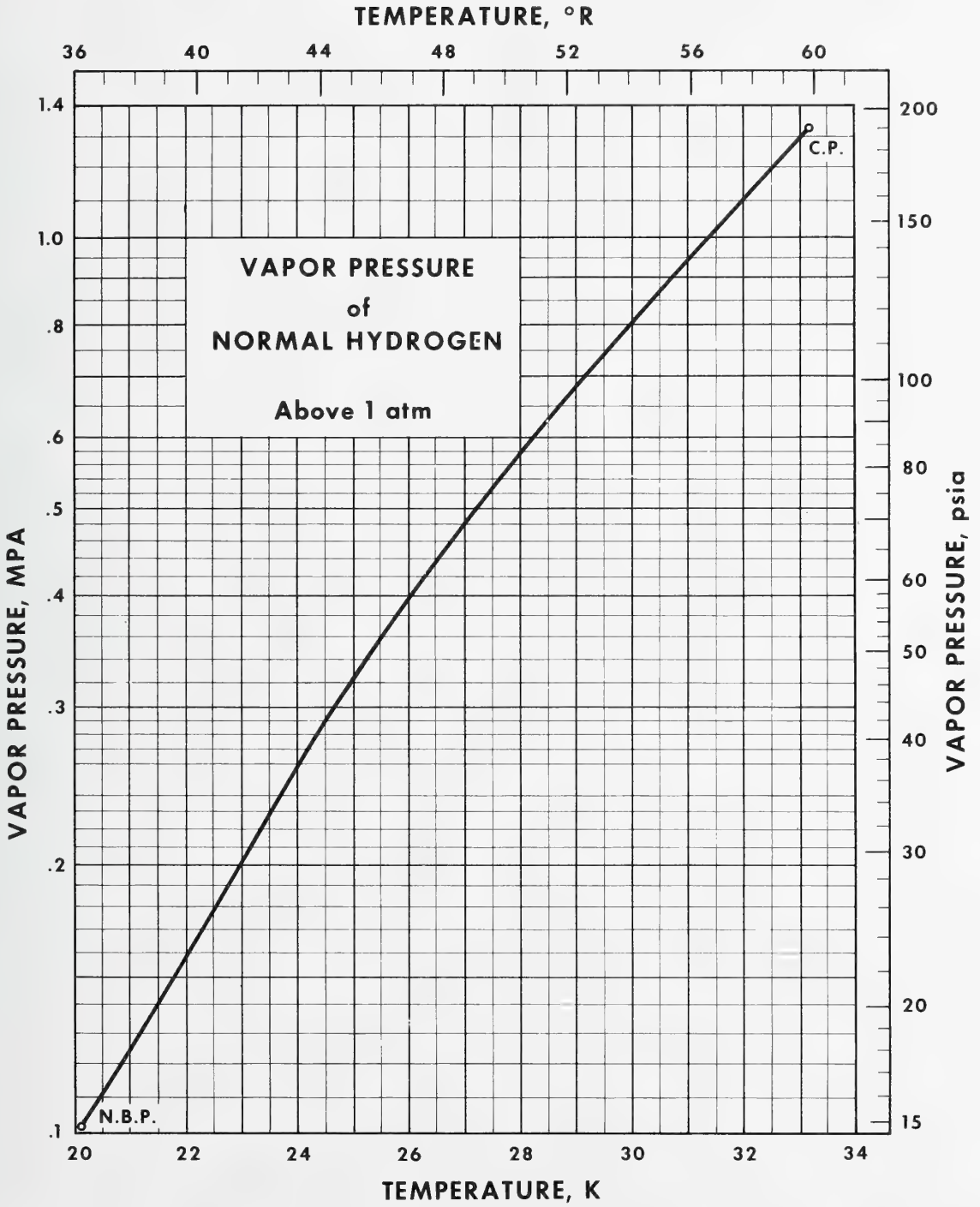


FIGURE 32. Vapor pressure of normal hydrogen above 0.101325 MPa (1 atm).

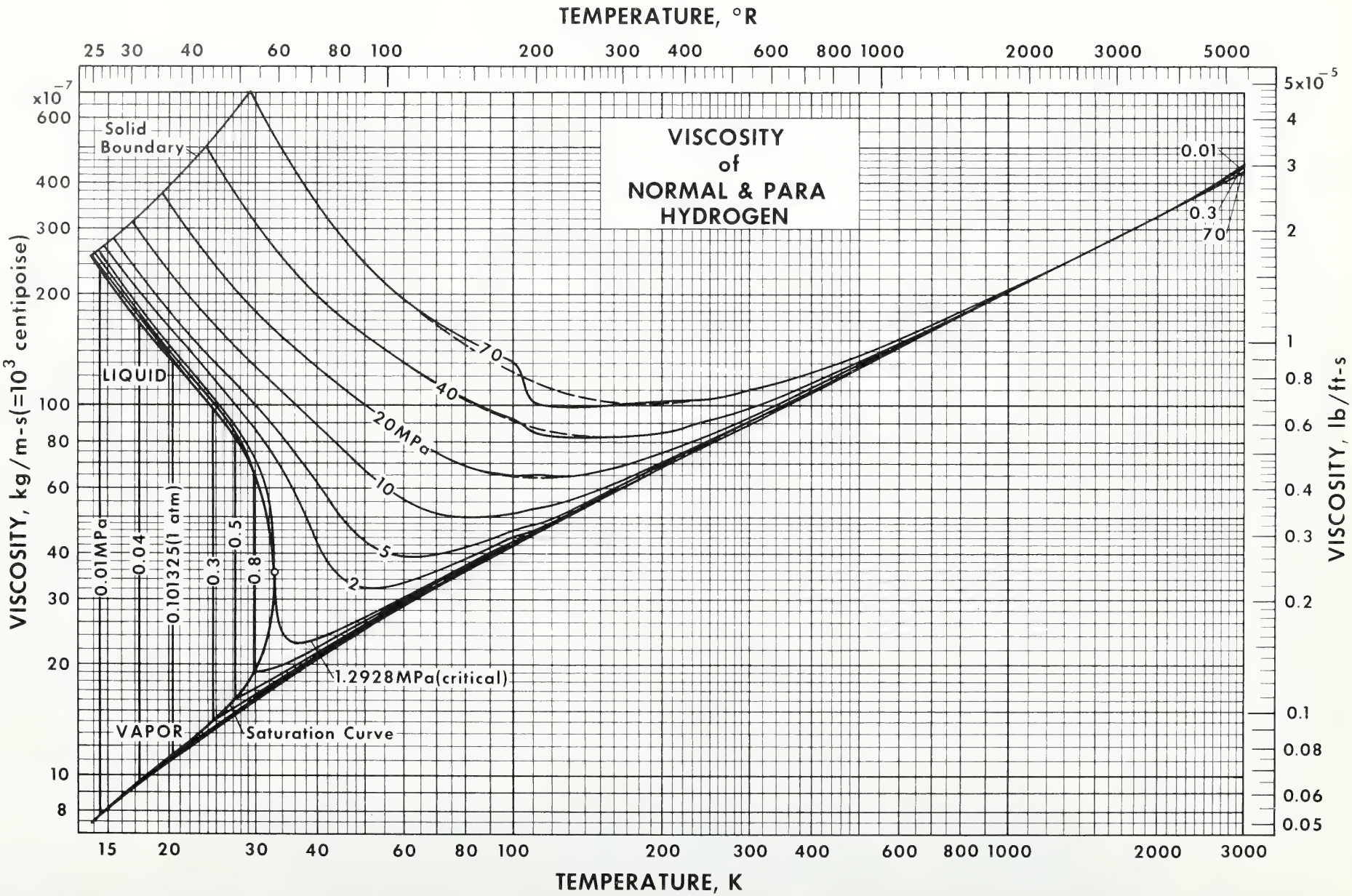


FIGURE 33. Viscosity of normal and parahydrogen.

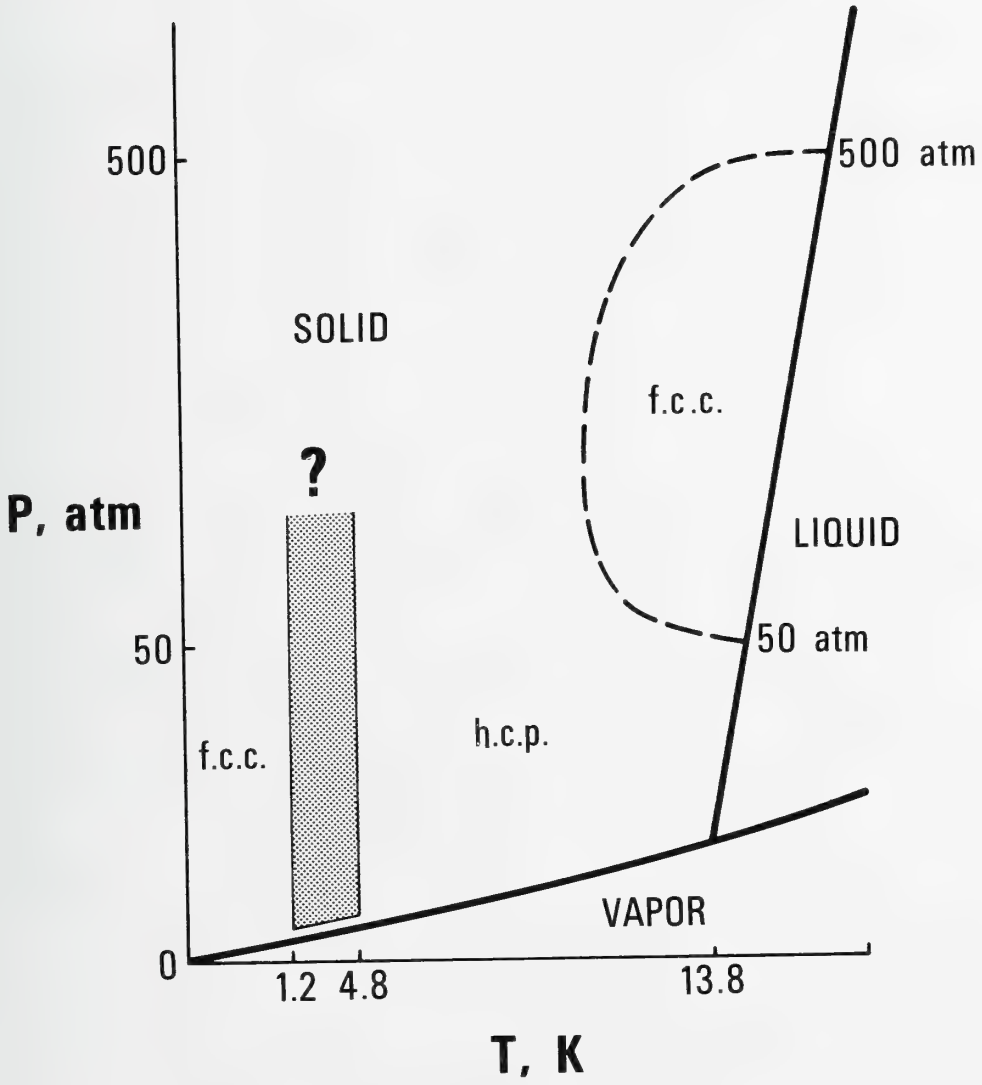


FIGURE 34a. Location of the different crystal structures in the solid hydrogen P-T plane.

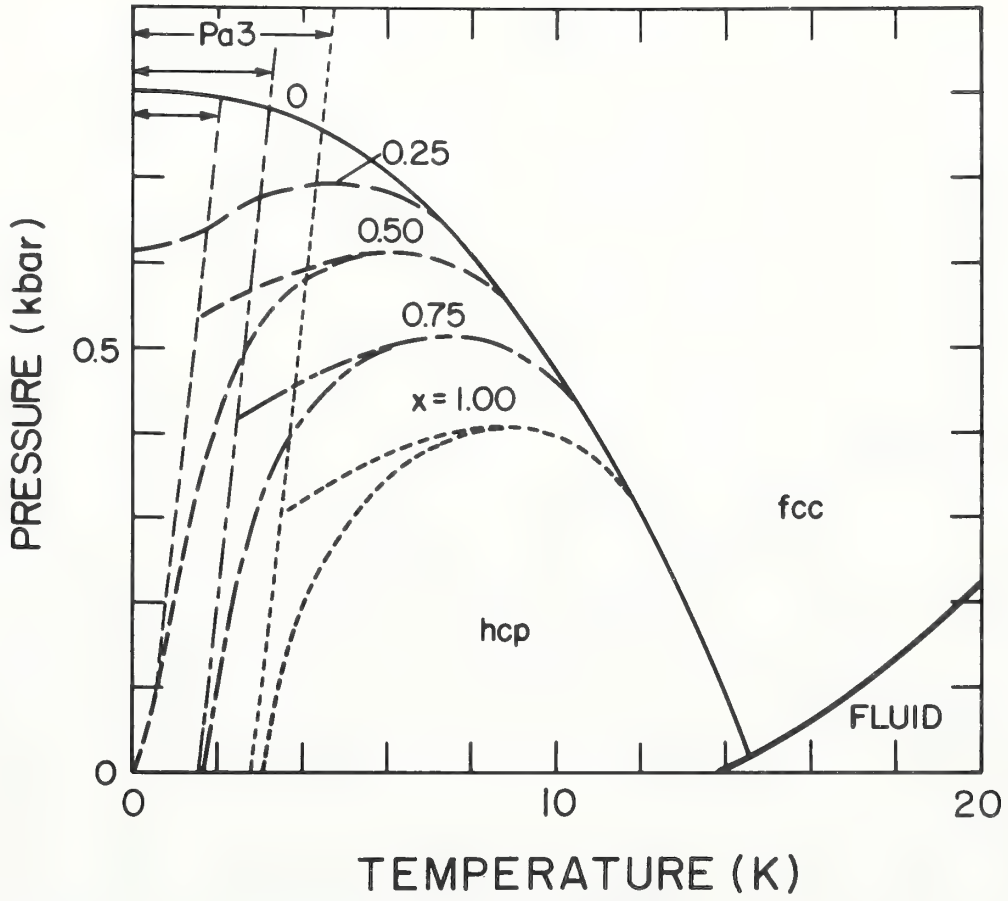


FIGURE 34b. Proposed phase diagram (P-T plane) for solid hydrogen.

Shown on a common temperature scale at various ortho mole fractions x. Solid line, x = 0; long-dash line, x = 0.25; short-dash line, x = 0.50; dash-dot line, x = 0.75; dotted line, x = 1. Alternate branches are shown for hcp-fcc transition. Heavy solid line is melting curve.

With permission from Mills, R. L., Journ. Low Temp. Phys., 31 (3-4), 423, 1978 [Ref. 159].

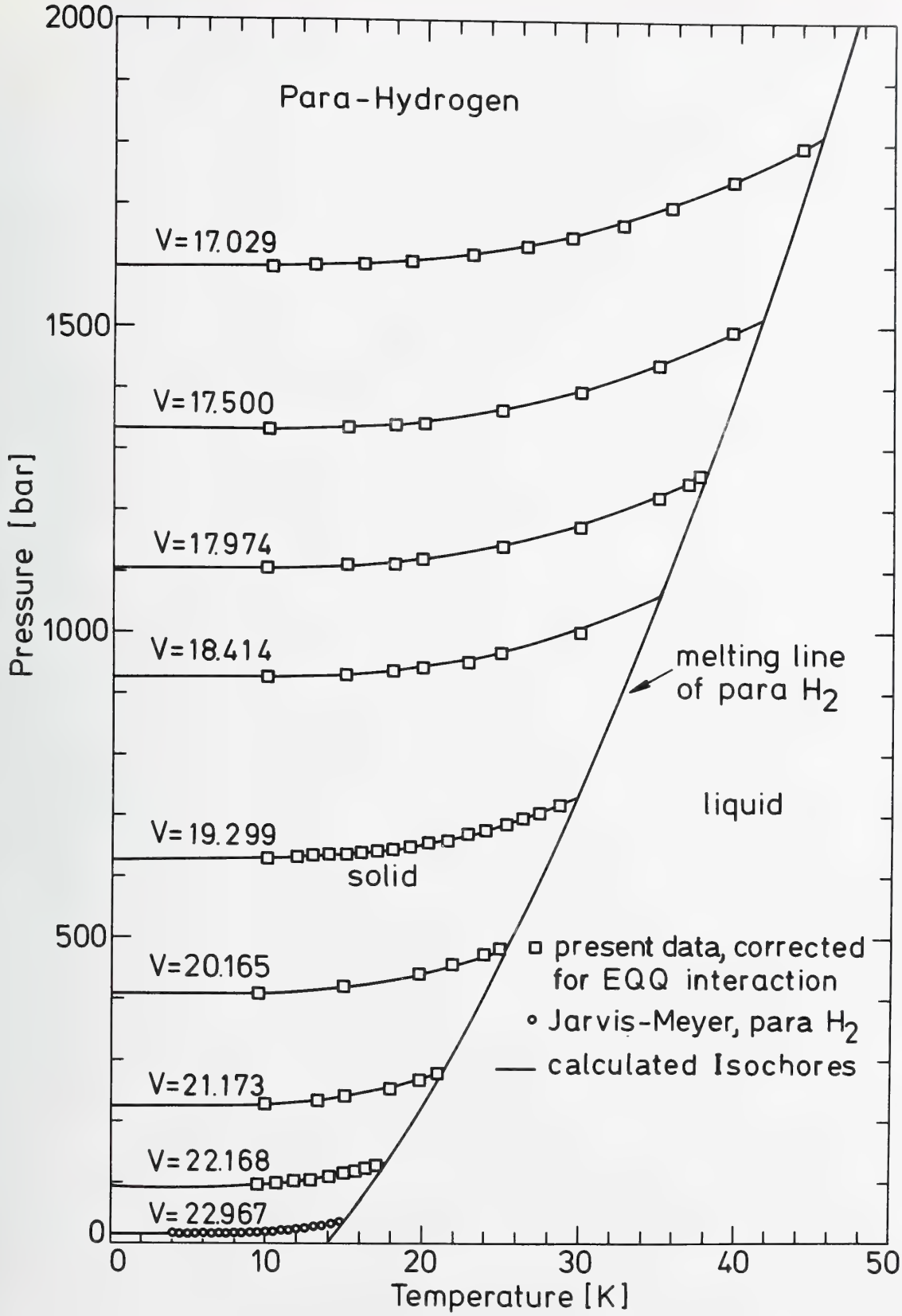


FIGURE 34c. Isochores of solid parahydrogen in the P-T plane.

With permission from Silvera, I. F., Phys. Lett., A68(2), 207, 1978 [Ref. 160].

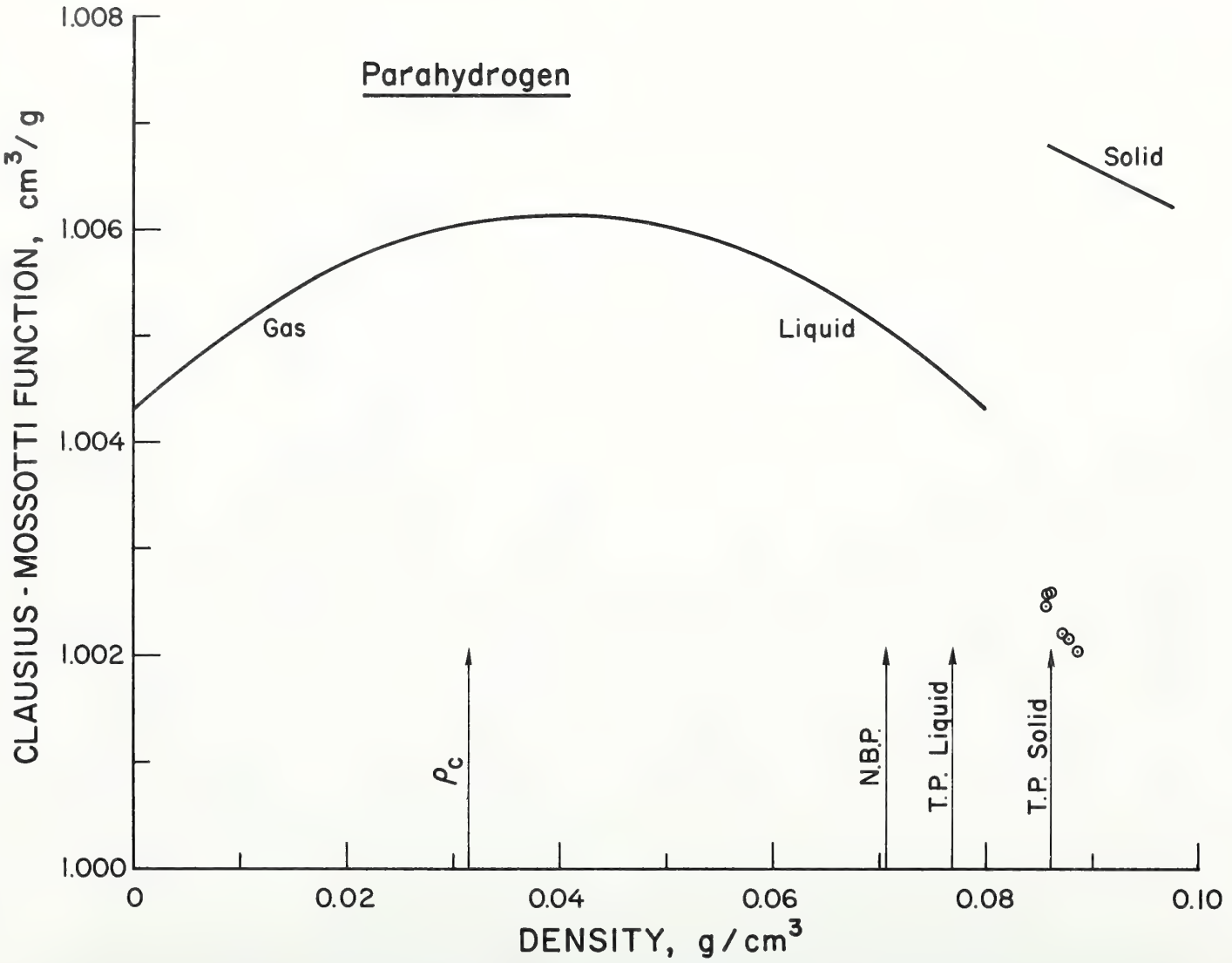


FIGURE 35. Clausius-Mossotti function for parahydrogen.

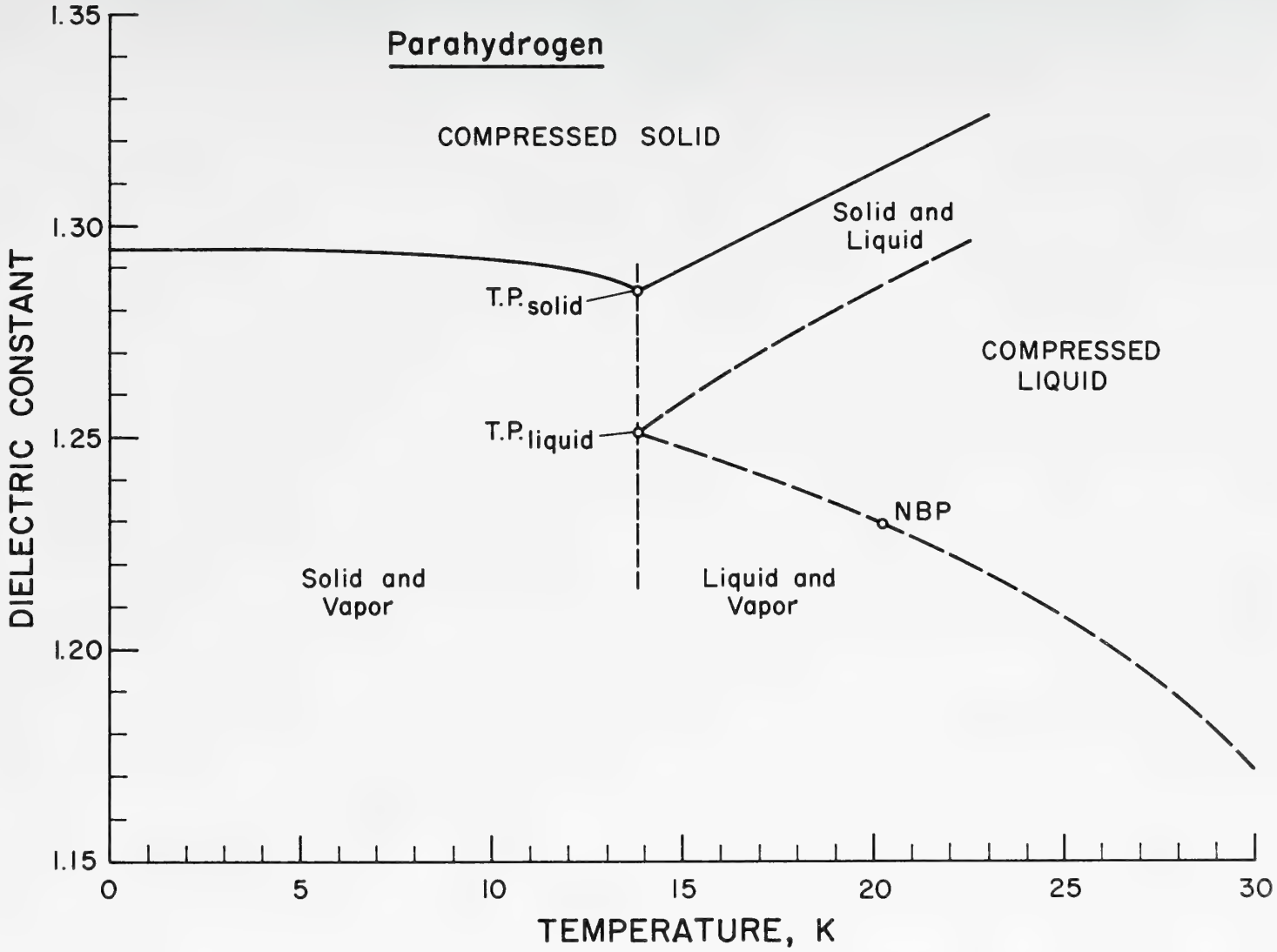


FIGURE 36. Dielectric constant of saturated liquid and solid parahydrogen.

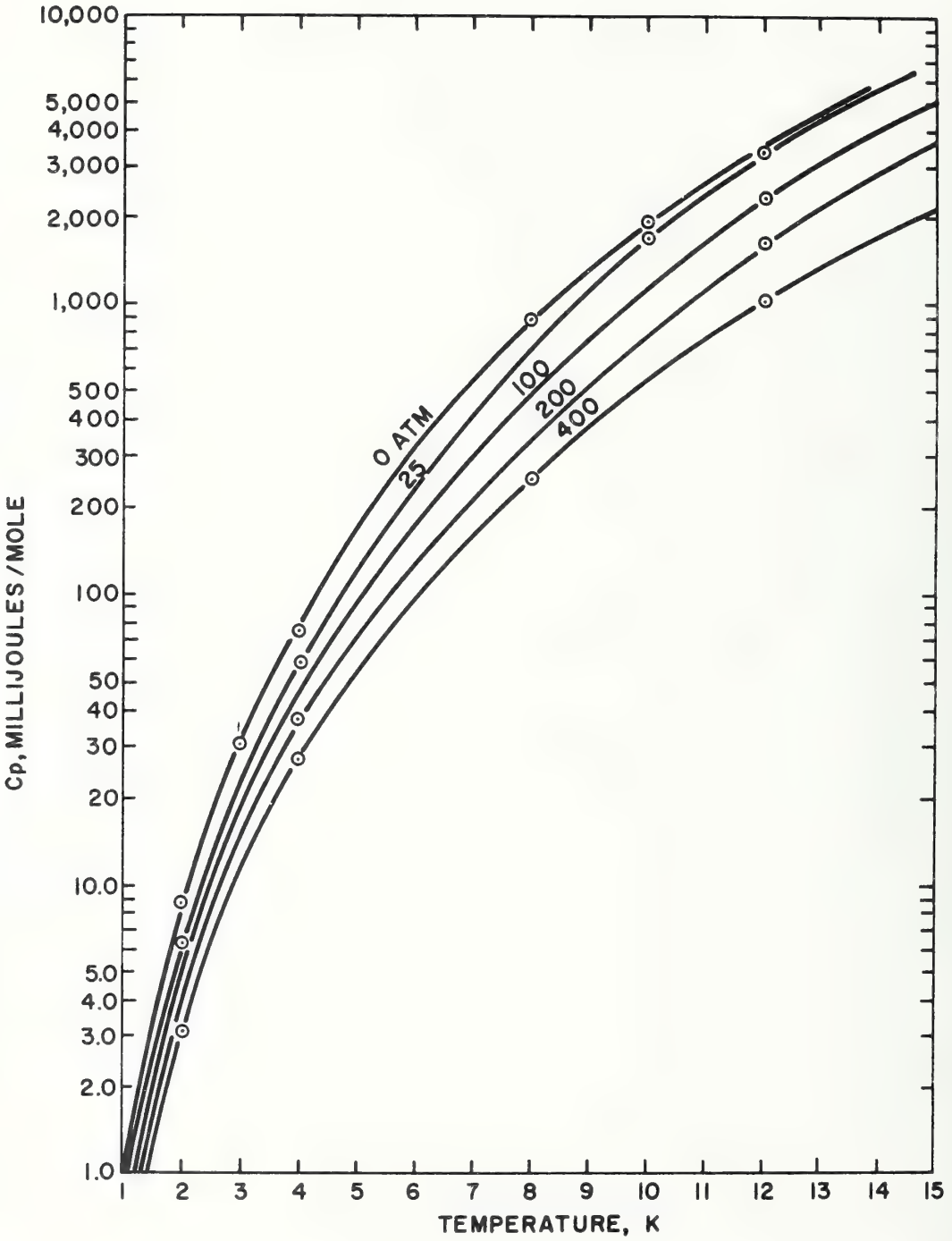


FIGURE 37. Isobars of C_p for compressed solid parahydrogen.

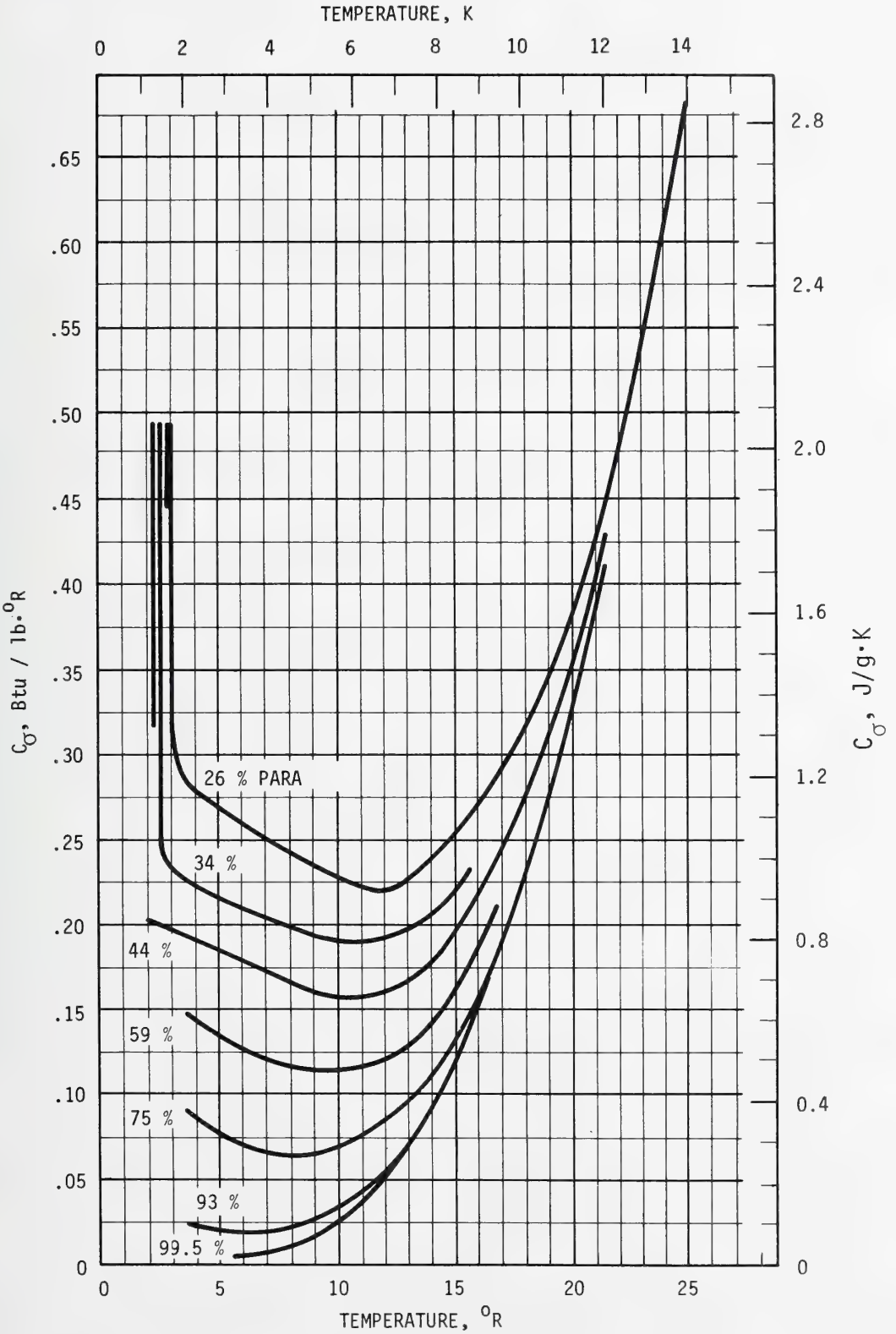


FIGURE 38. Specific heat (heat capacity) of saturated solid hydrogen.

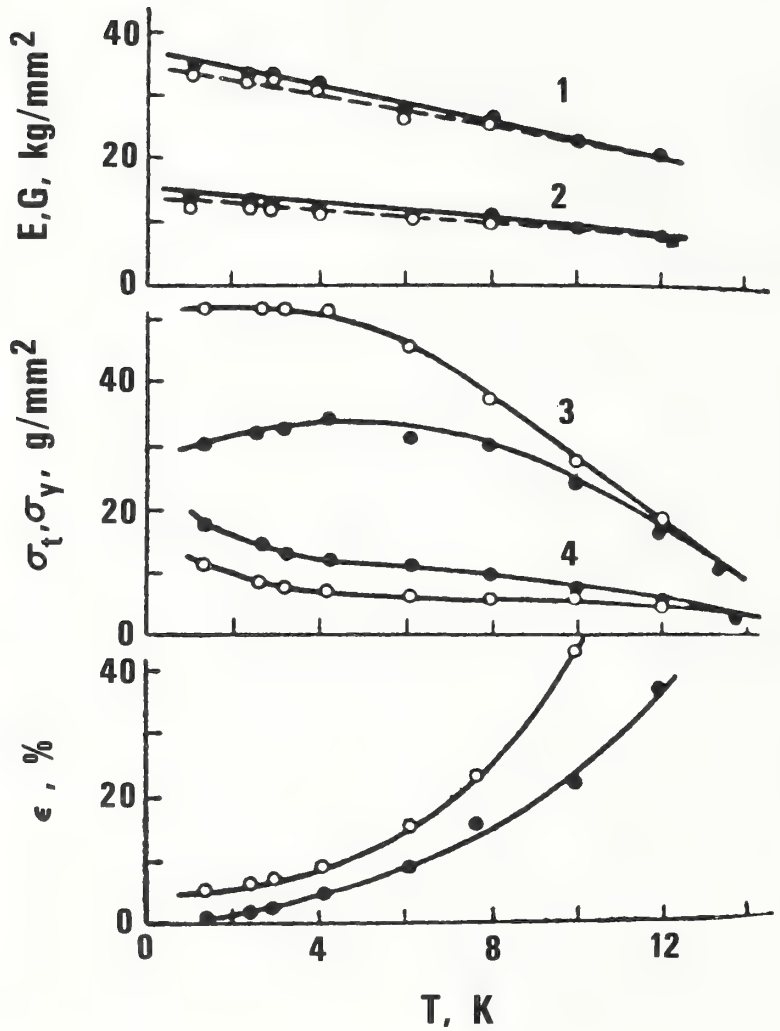


FIGURE 39. Temperature dependencies of the mechanical properties of normal and parahydrogen.

1 - is Young's modulus (E), 2 - the shear modulus (G), 3 - tensile strength (σ_t), 4 - nominal yield stress (σ_y), ε - relative elongation.

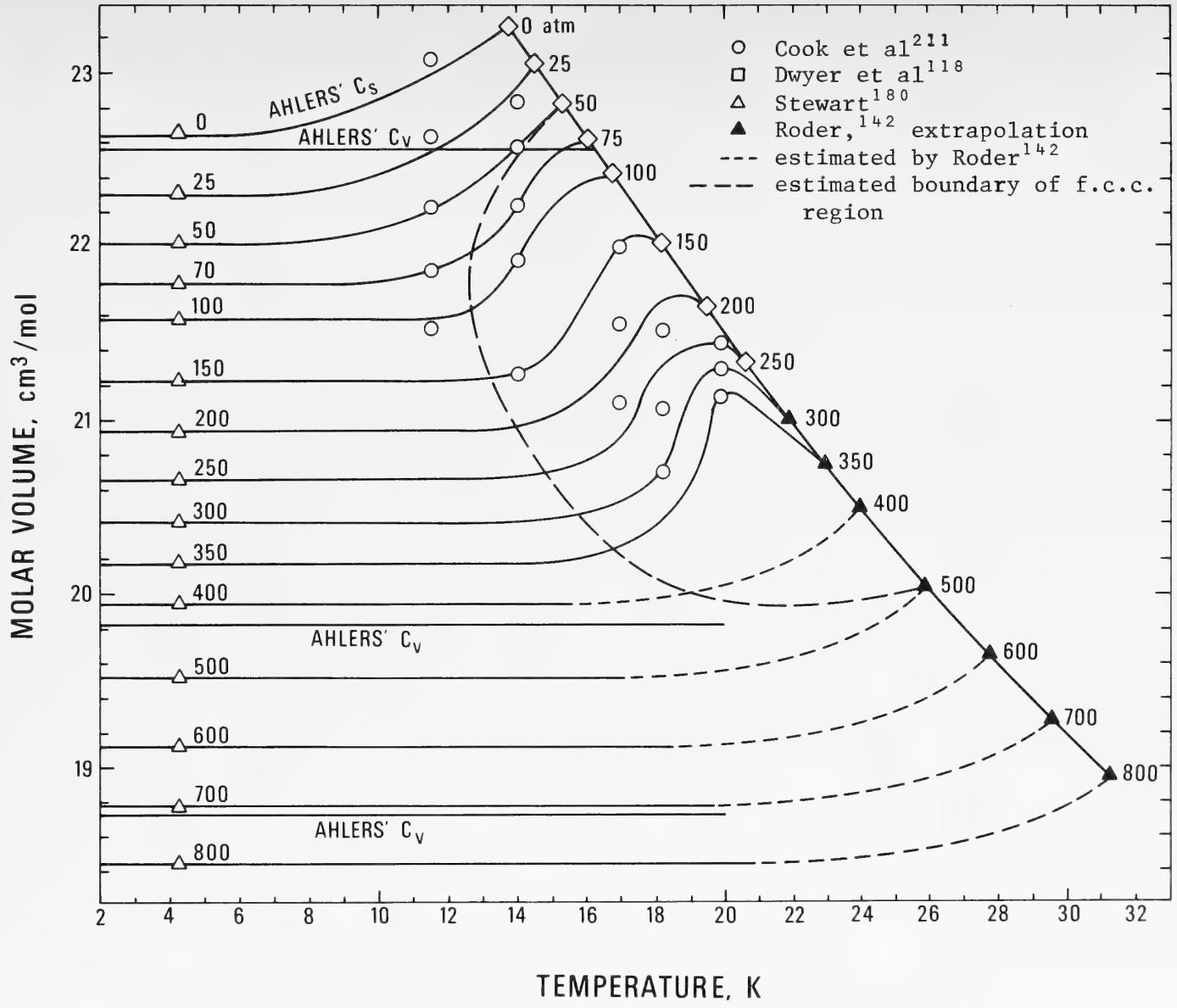


FIGURE 40a. PVT diagram for compressed solid parahydrogen at low pressures.

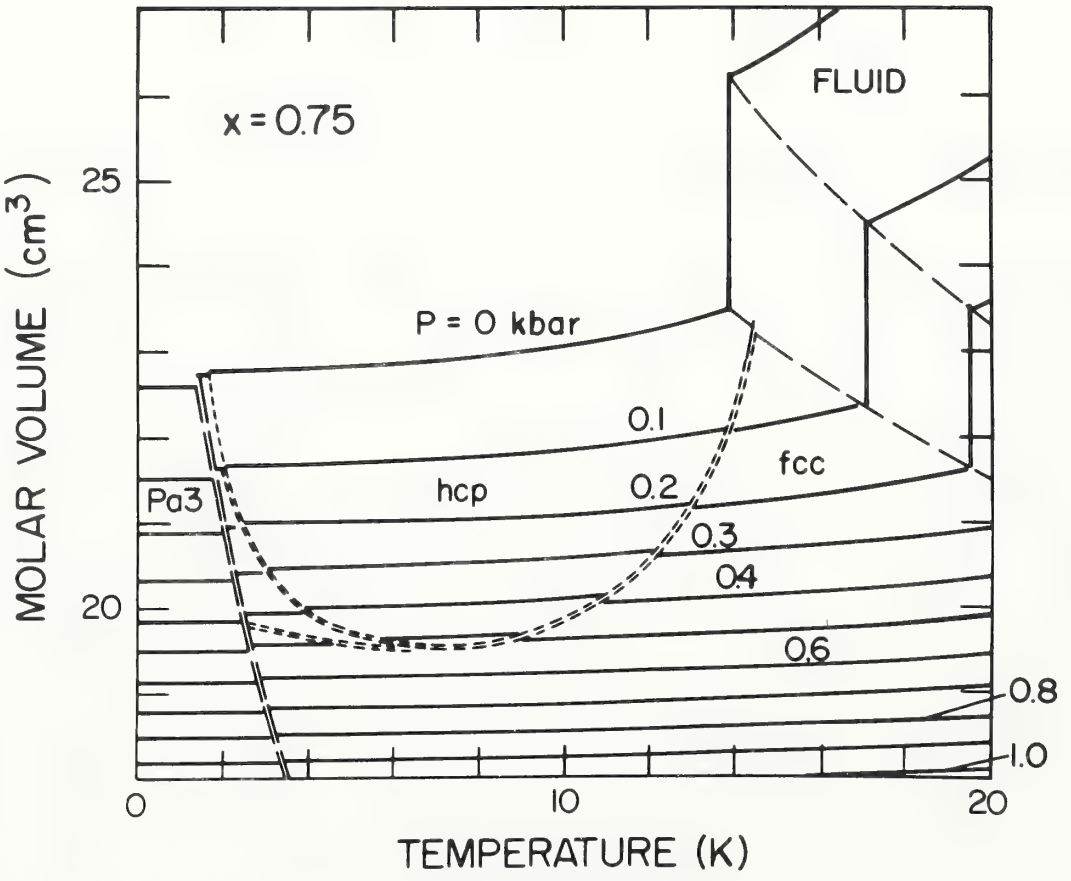


FIGURE 40b. Proposed phase diagram for solid normal hydrogen.

V-T plane for n-H_2 (x = 0.75). Dashed lines indicate alternate branches for hcp-fcc transition curve.

With permission from Mills, R. L., Journ. Low Temp. Phys., 31 (3-4), 423, 1978 [Ref. 159].

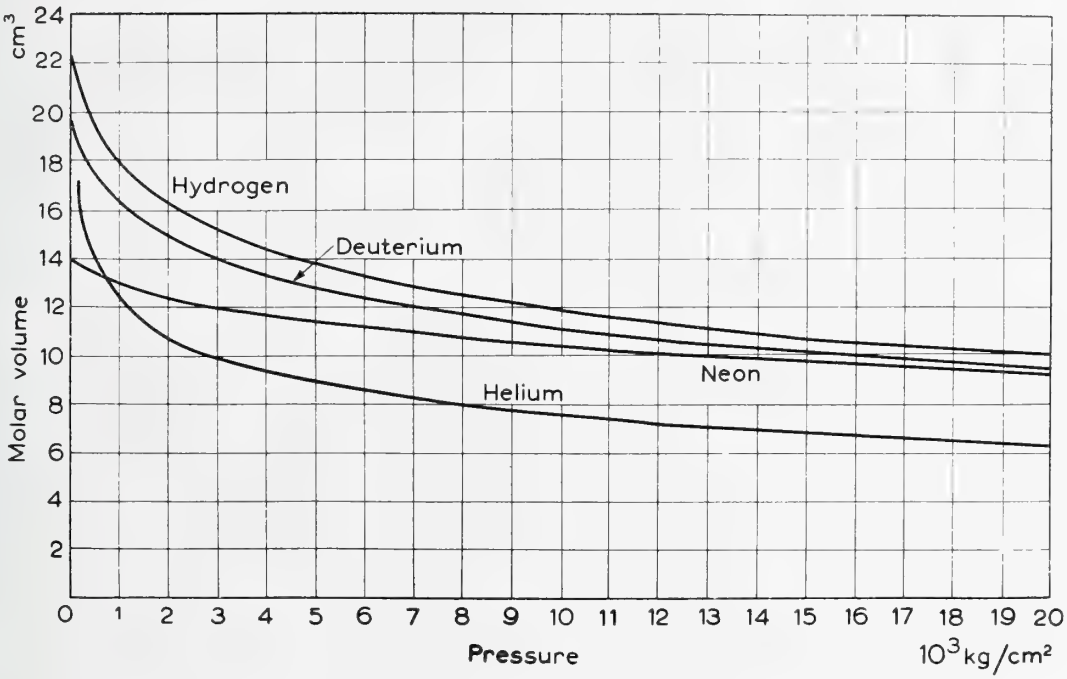


FIGURE 41. PVT diagram for compressed solid hydrogen at high pressures and 4K.

With permission from Stewart, J. W., Phys. Chem. Solids, 1, 146, 1956 [Ref. 180].

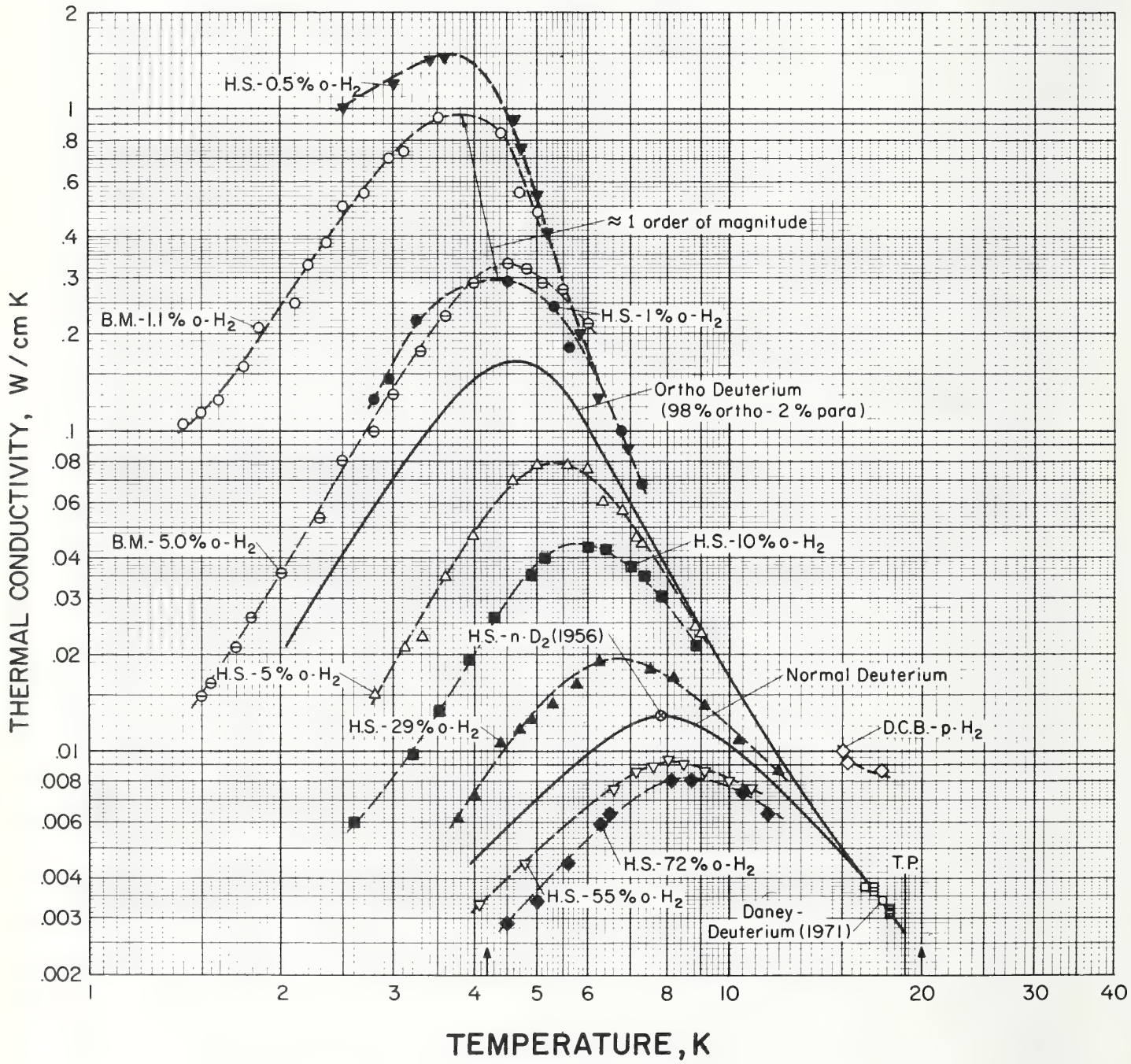


FIGURE 42. Thermal conductivity of solid hydrogen.

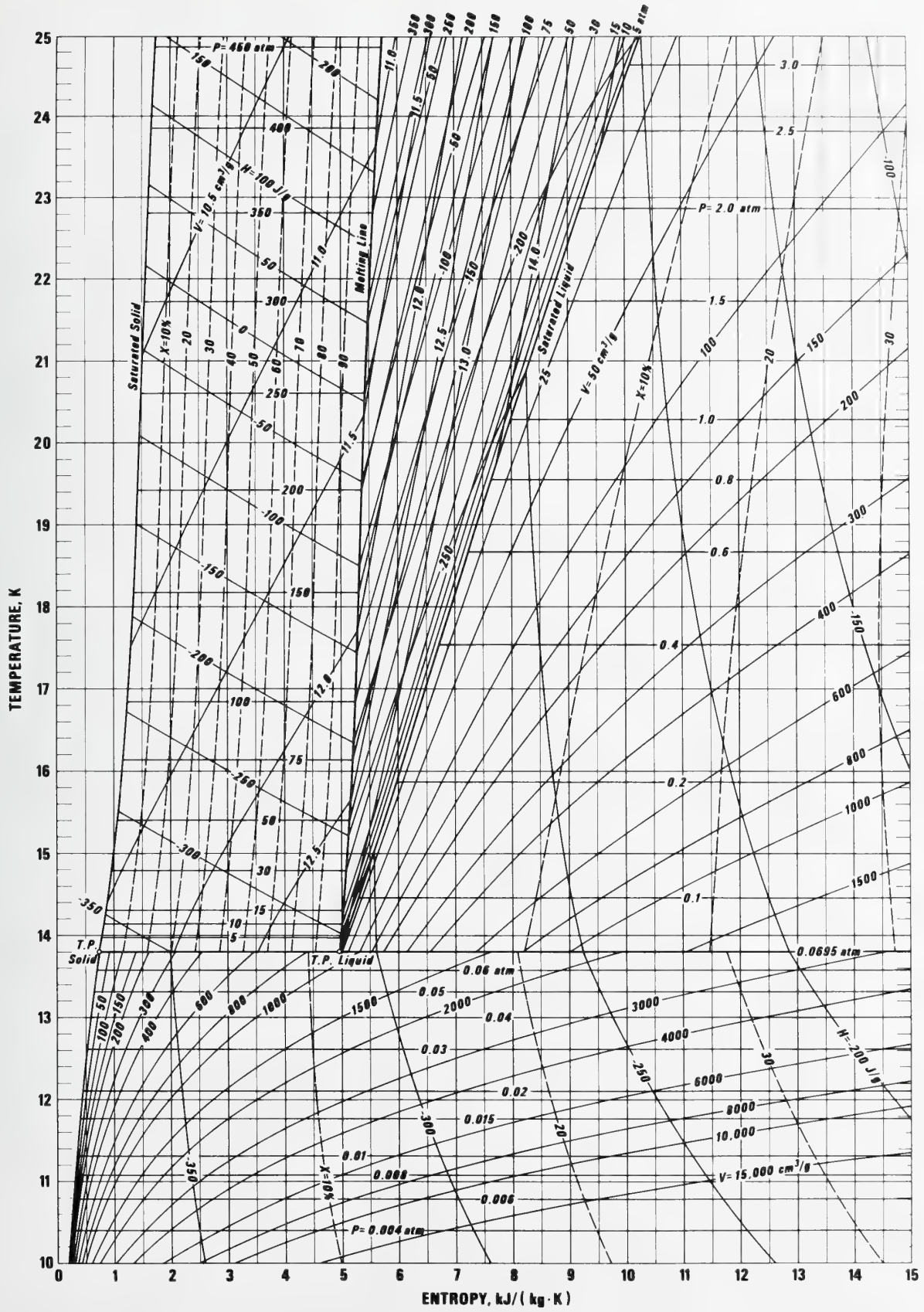


FIGURE 43. Parahydrogen, temperature-entropy diagram (10 to 25 K).

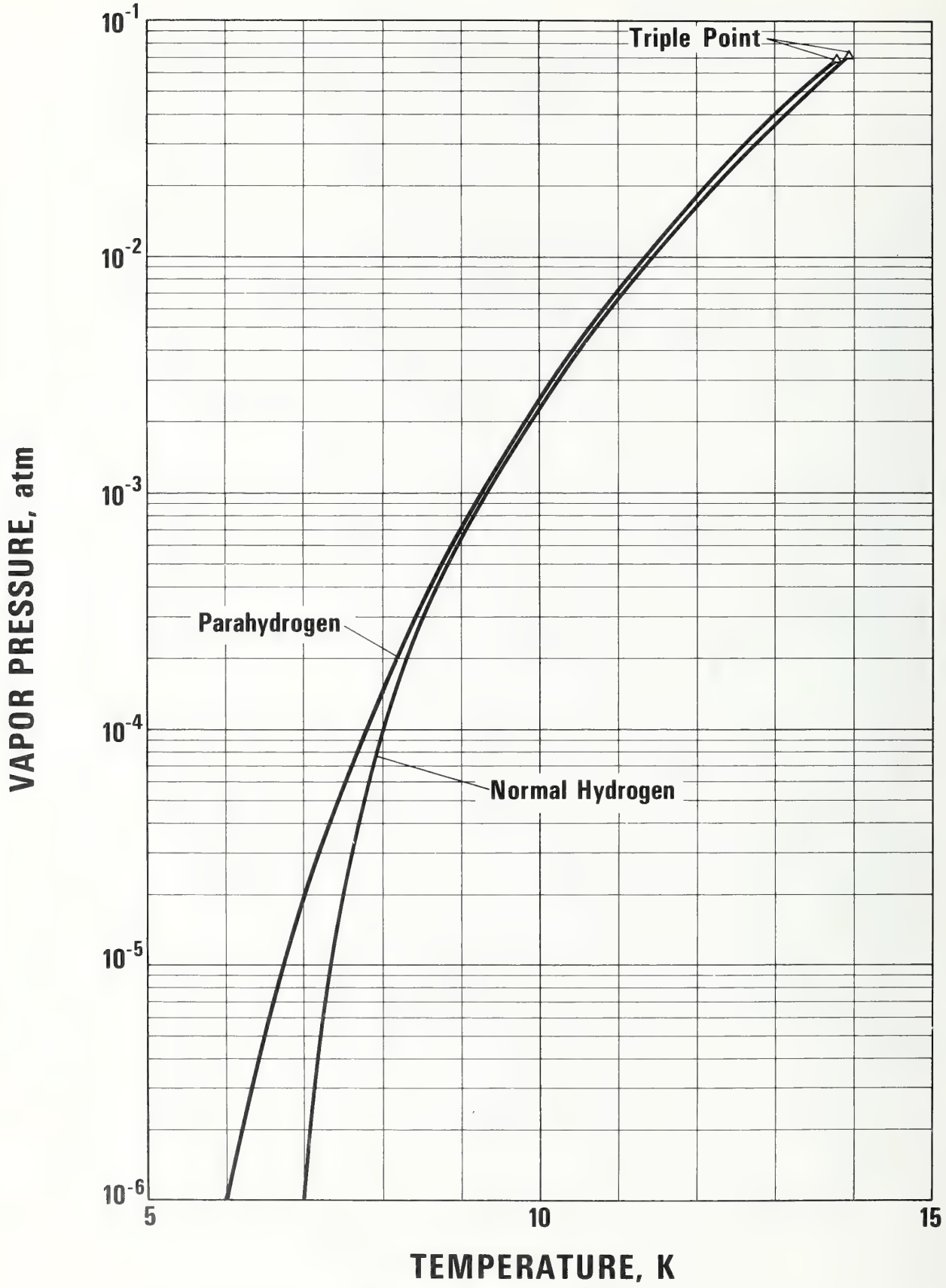


FIGURE 44. Vapor pressures of hydrogen below the triple point.

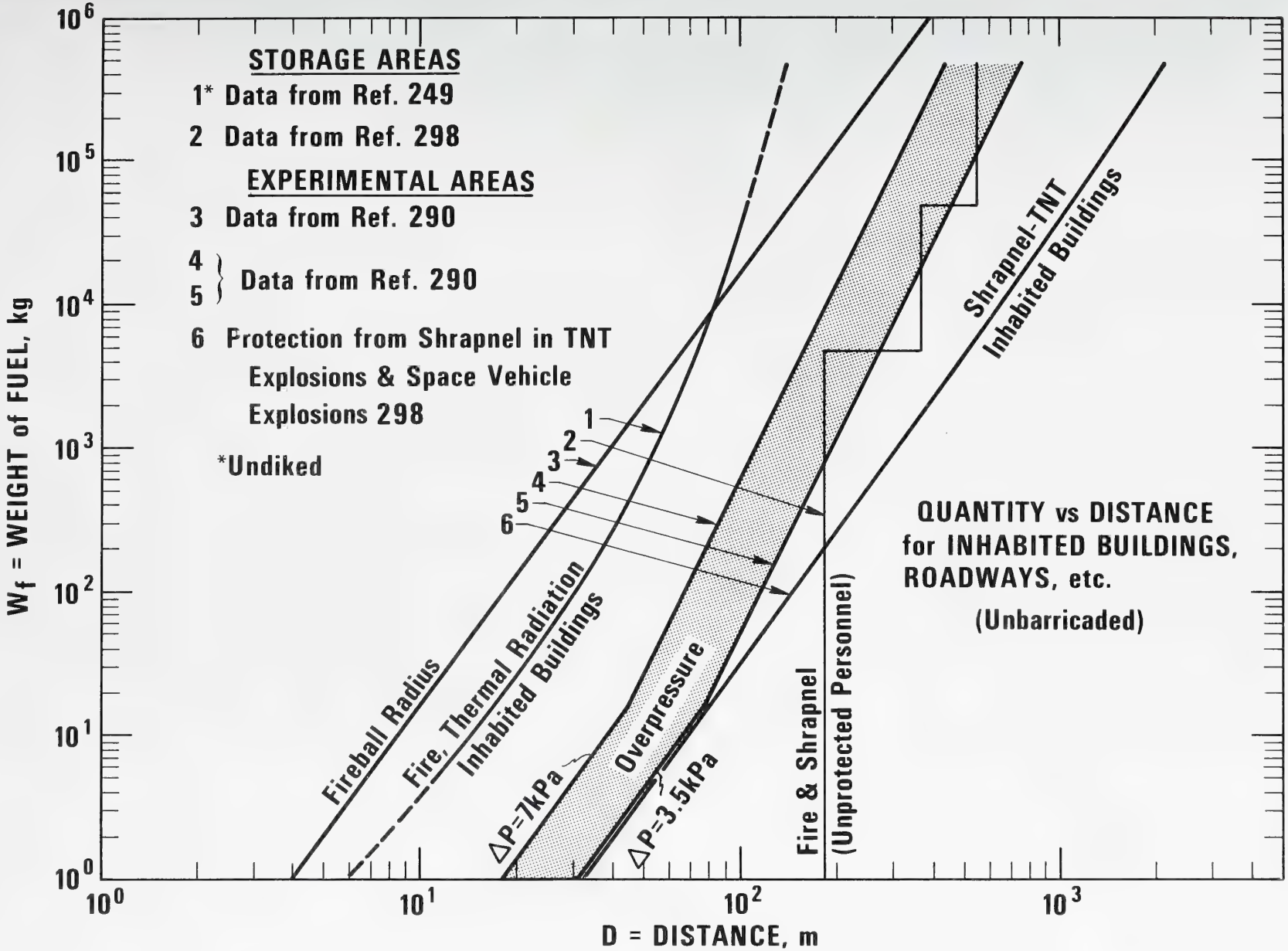


FIGURE 45. Quantity-distance relationships for the protection of personnel near liquid hydrogen storage and experimental areas (unbarricaded).

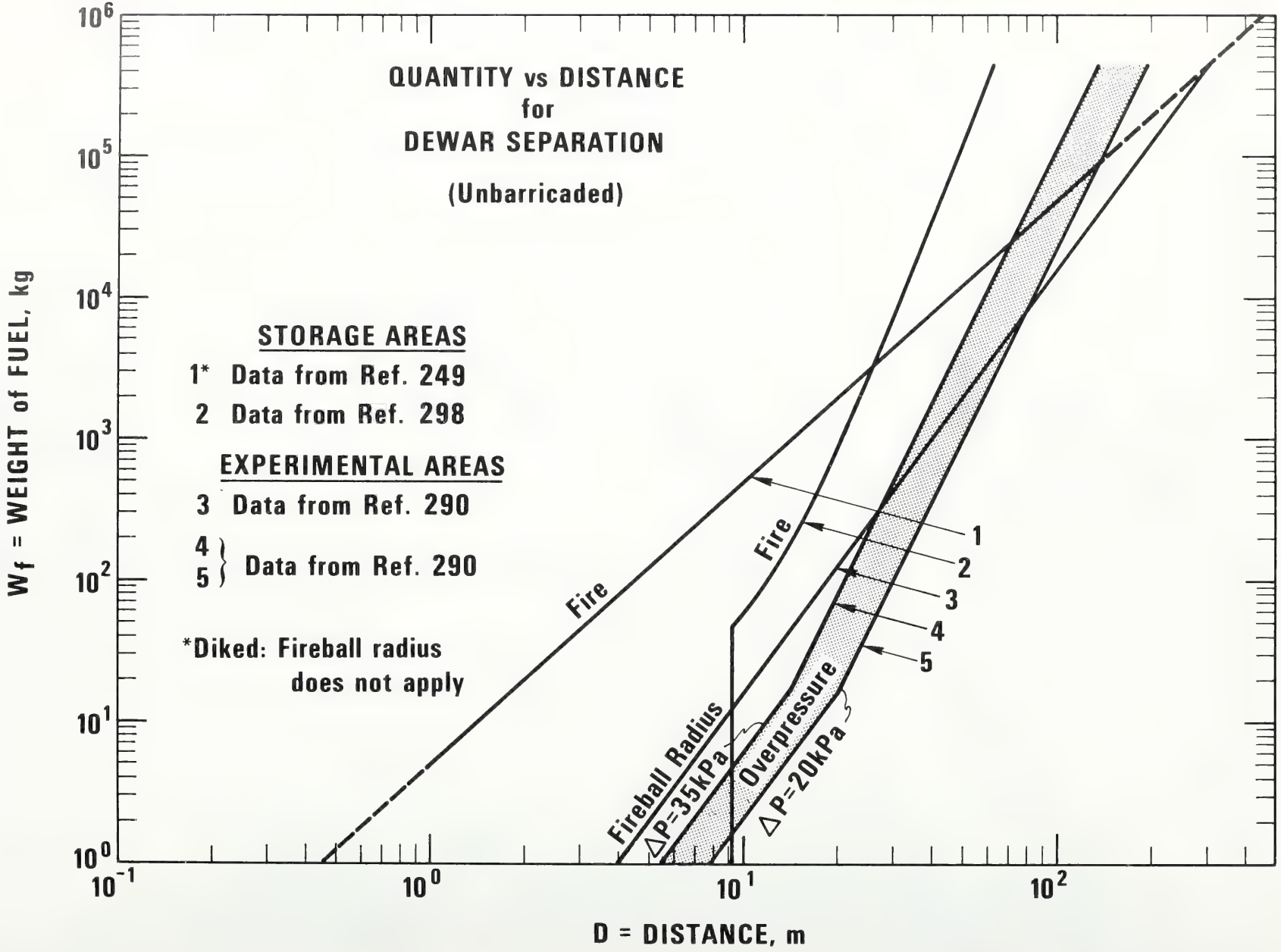


Figure 46. Quantity-distance relationships for liquid hydrogen dewar separation in storage and experimental areas (unbarricaded).

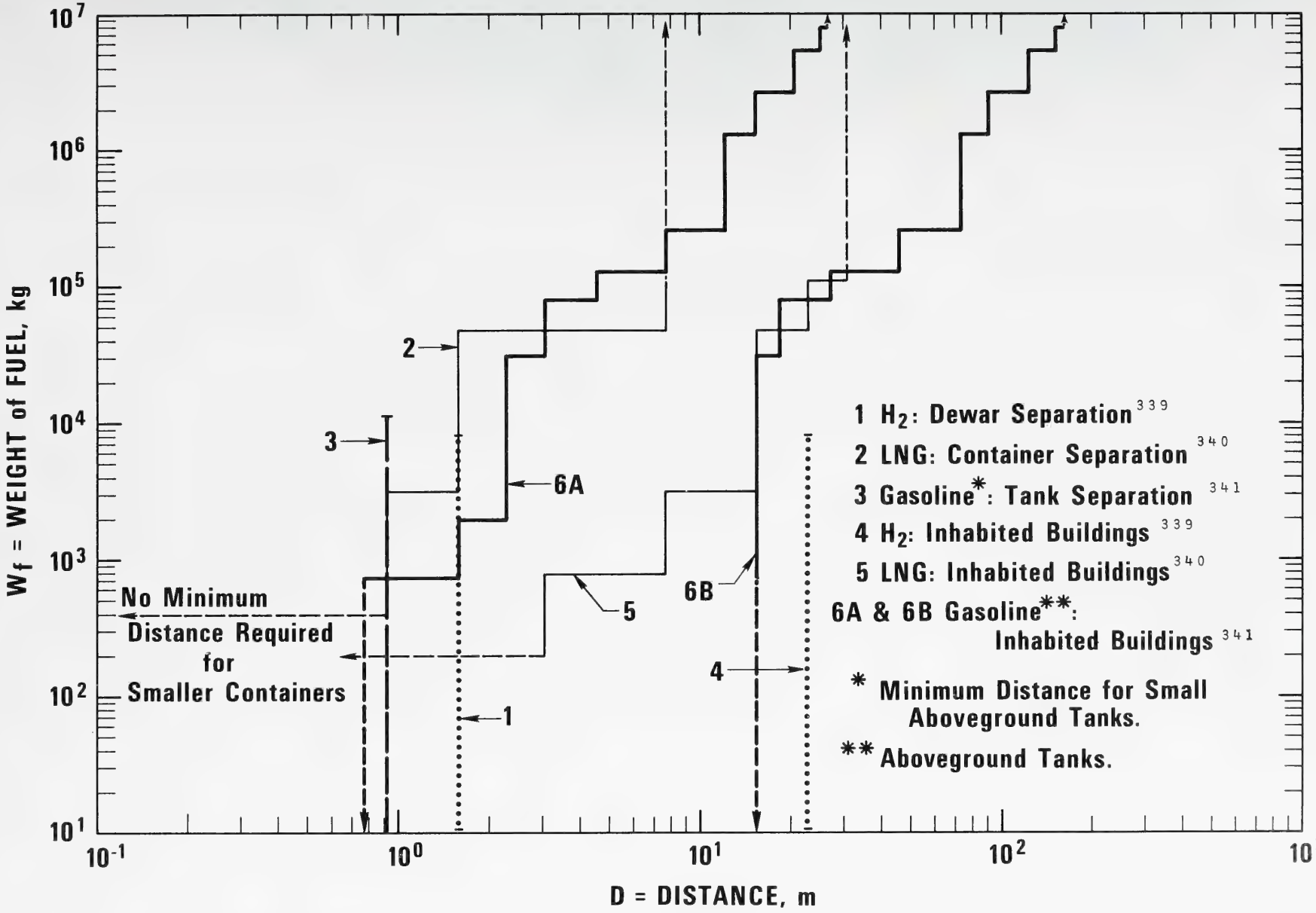


FIGURE 47. Industrial storage standards (quantity-distance) for hydrogen, liquefied natural gas (LNG), and gasoline.

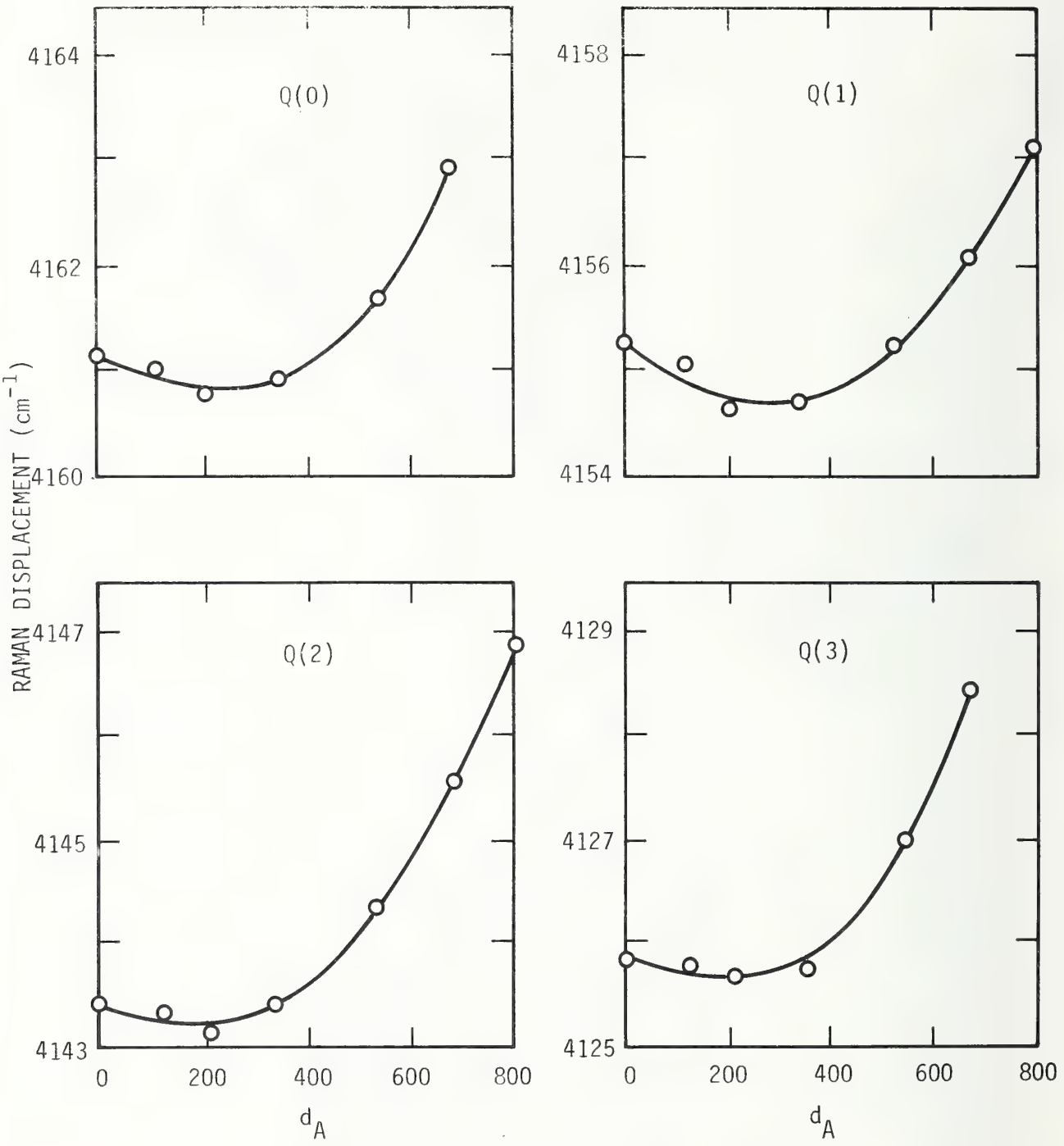


FIGURE 48. Raman displacement. Note: d_A = density in Amagats and Amagats x 0.089881 = kg/m^3. See Chapter 7 for density conversions.

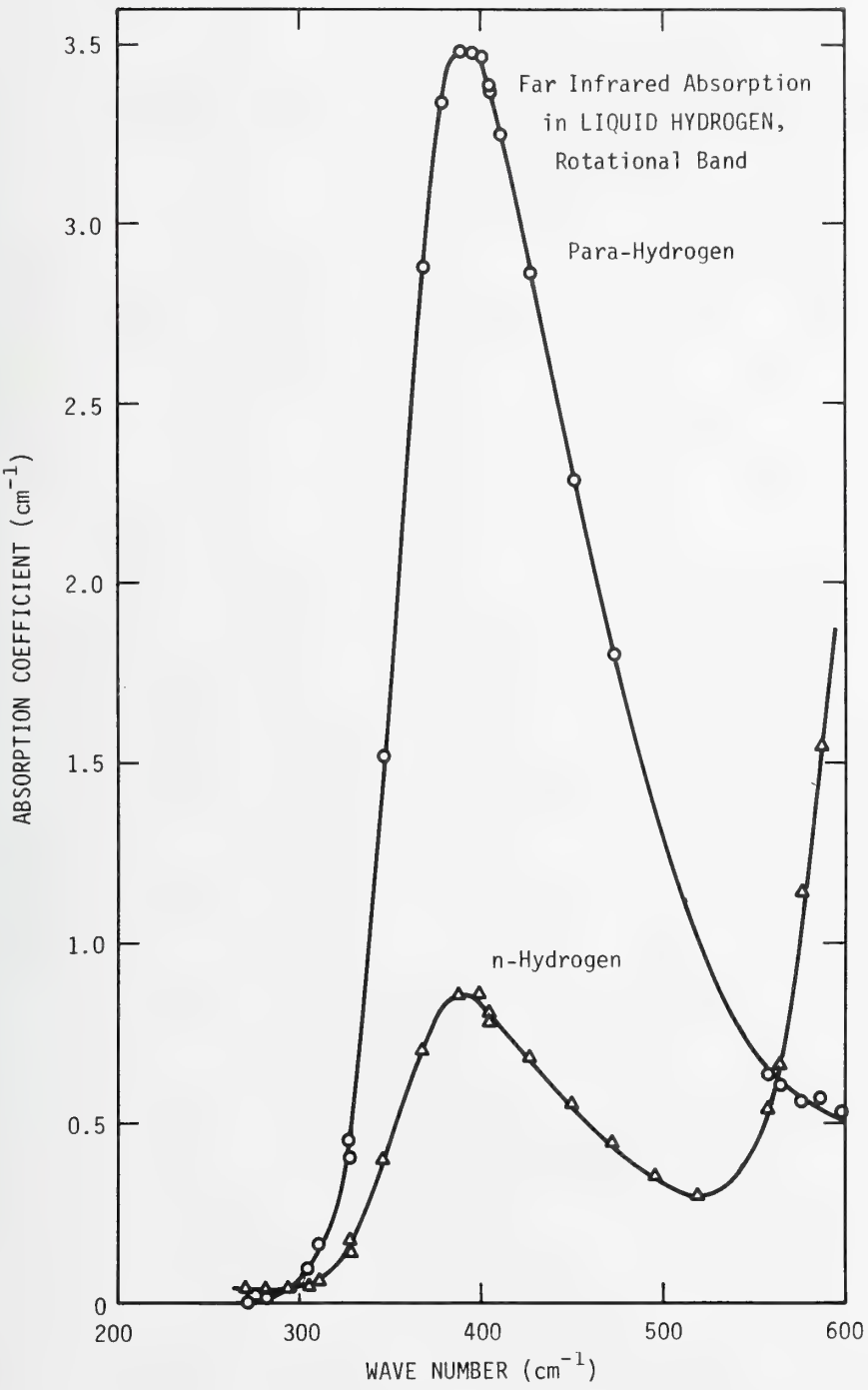


FIGURE 49. Far infrared absorption in liquid hydrogen (rotational band).

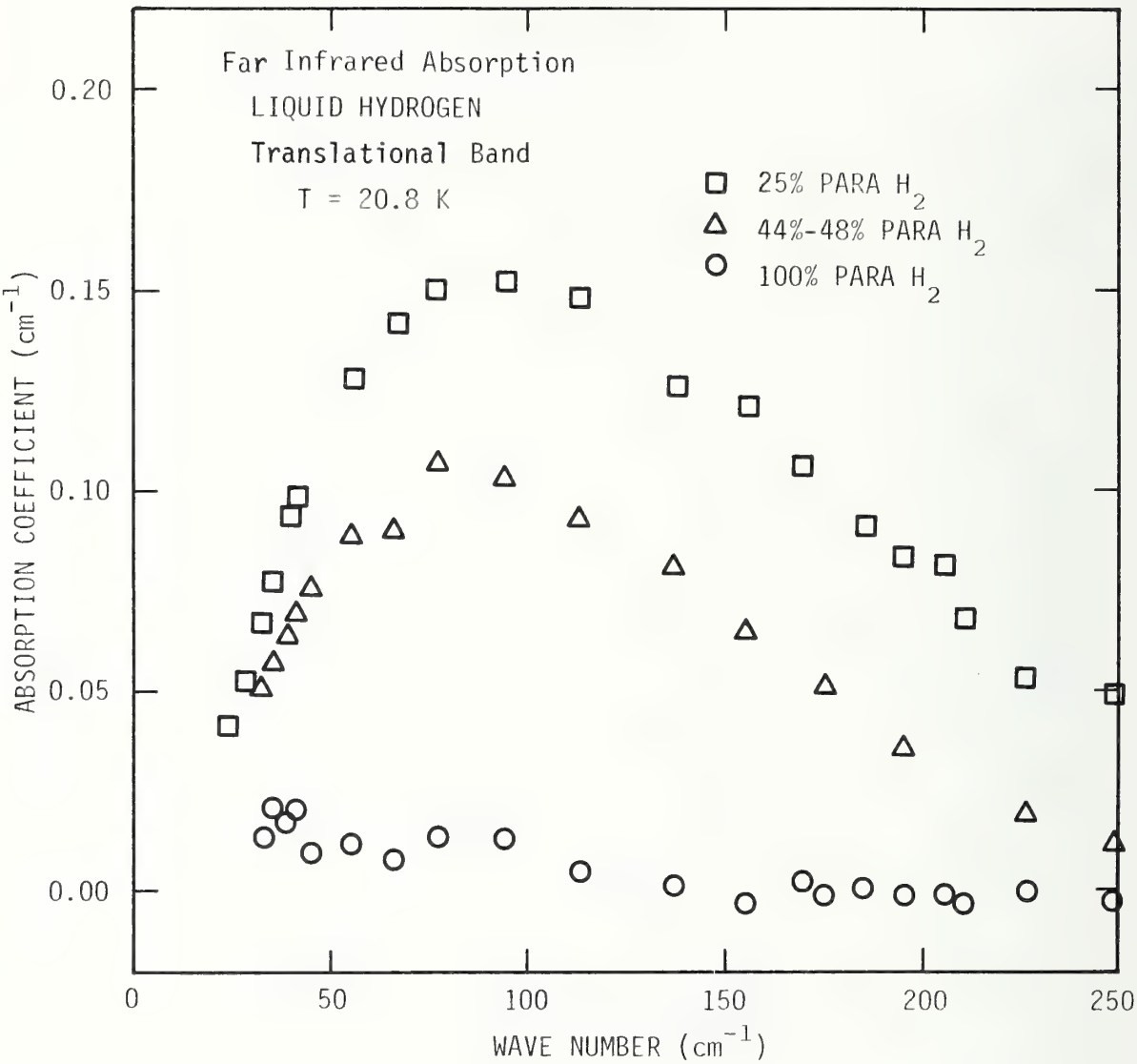


FIGURE 50. Far infrared absorption in liquid hydrogen (translational band).

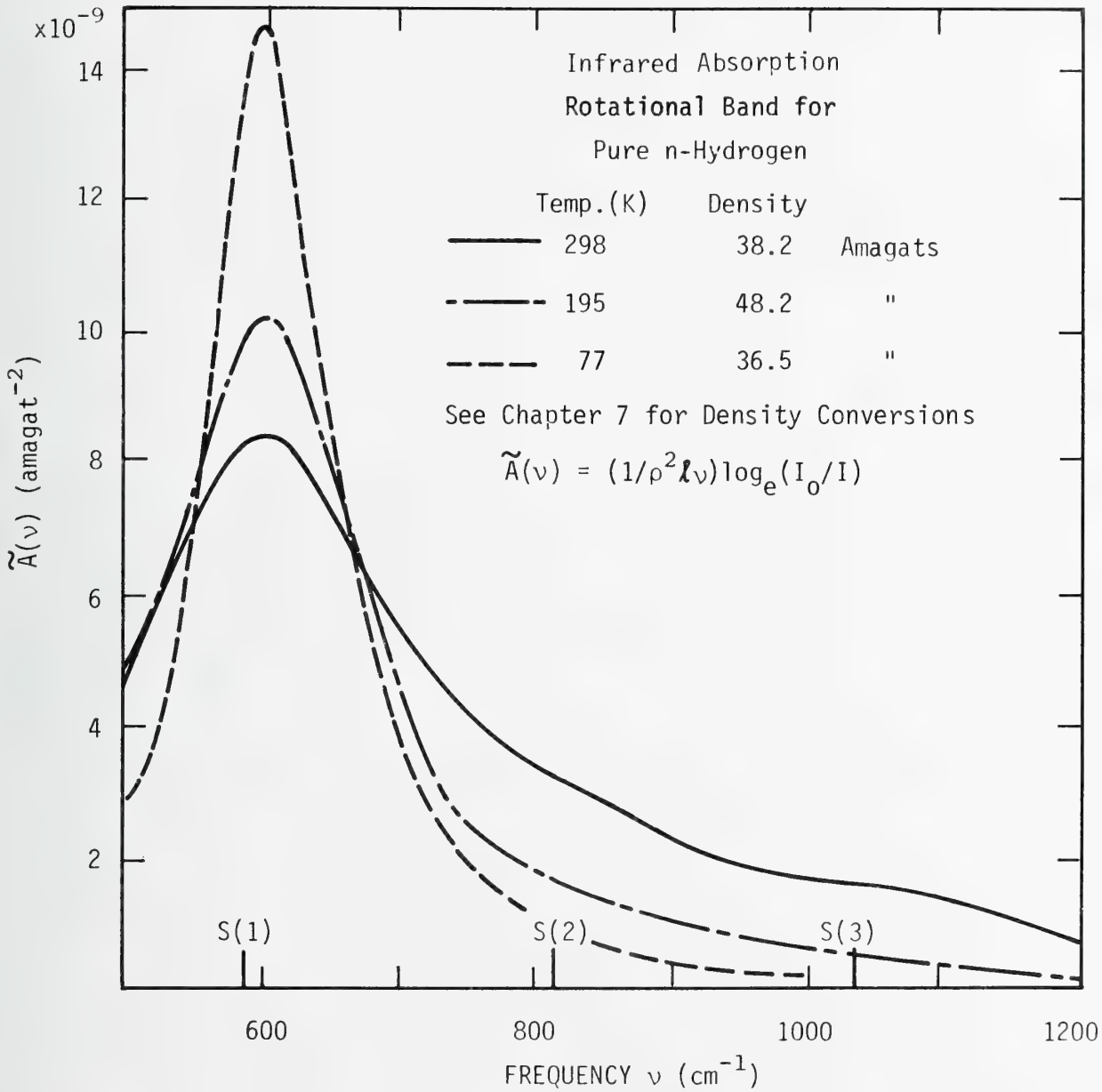


FIGURE 51. Infrared absorption (rotational band) for normal hydrogen.

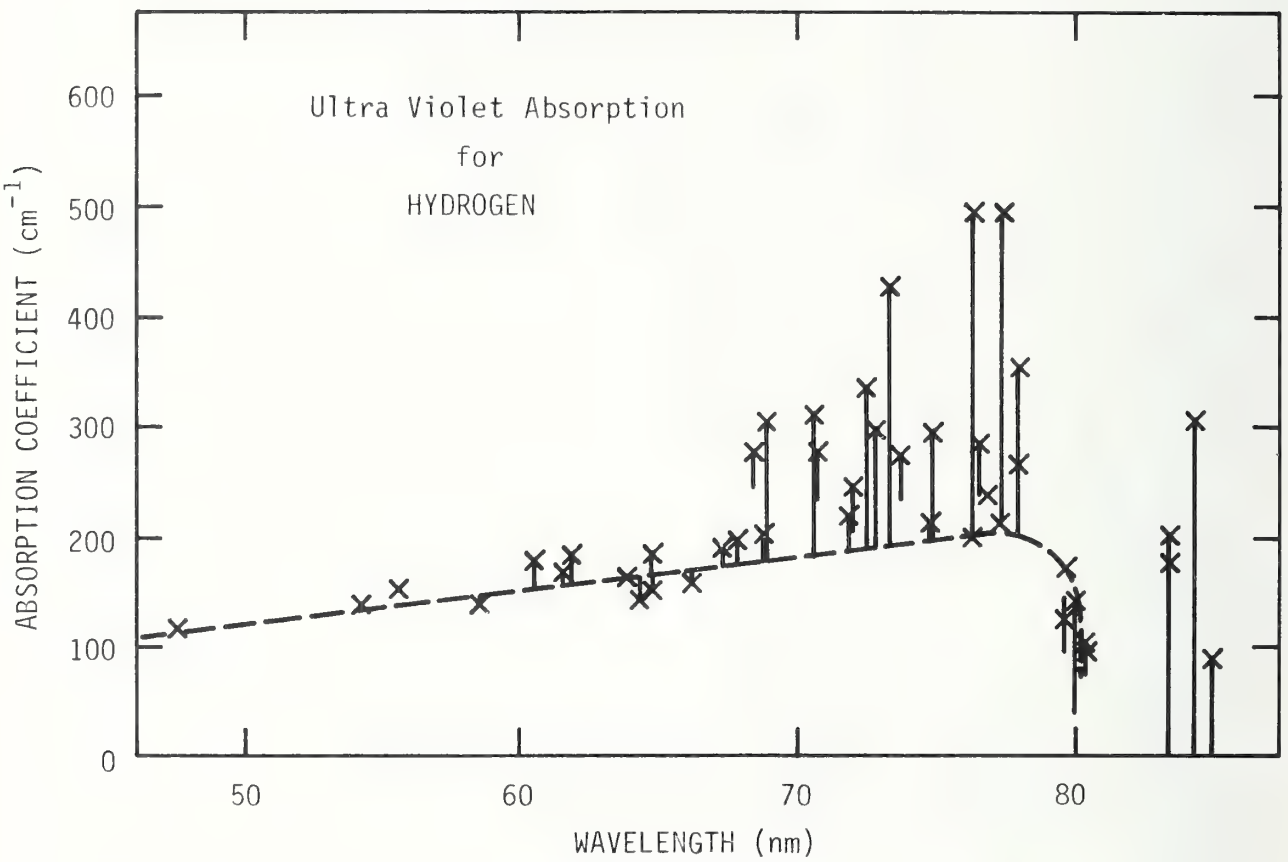


FIGURE 52. Ultraviolet absorption for hydrogen.

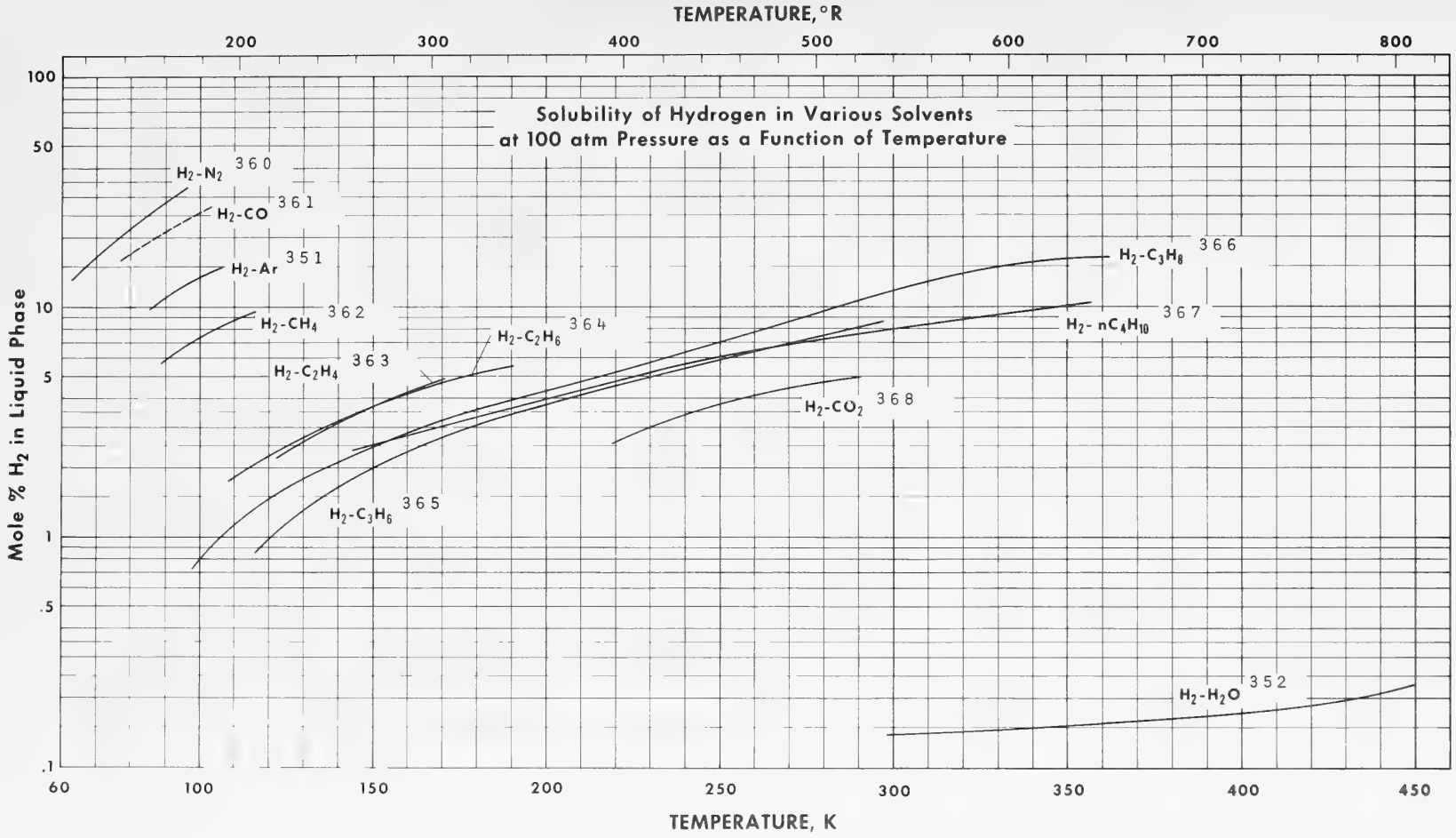


FIGURE 53. Solubility of hydrogen in various solvents at 10.1325 MPa (100 atm)

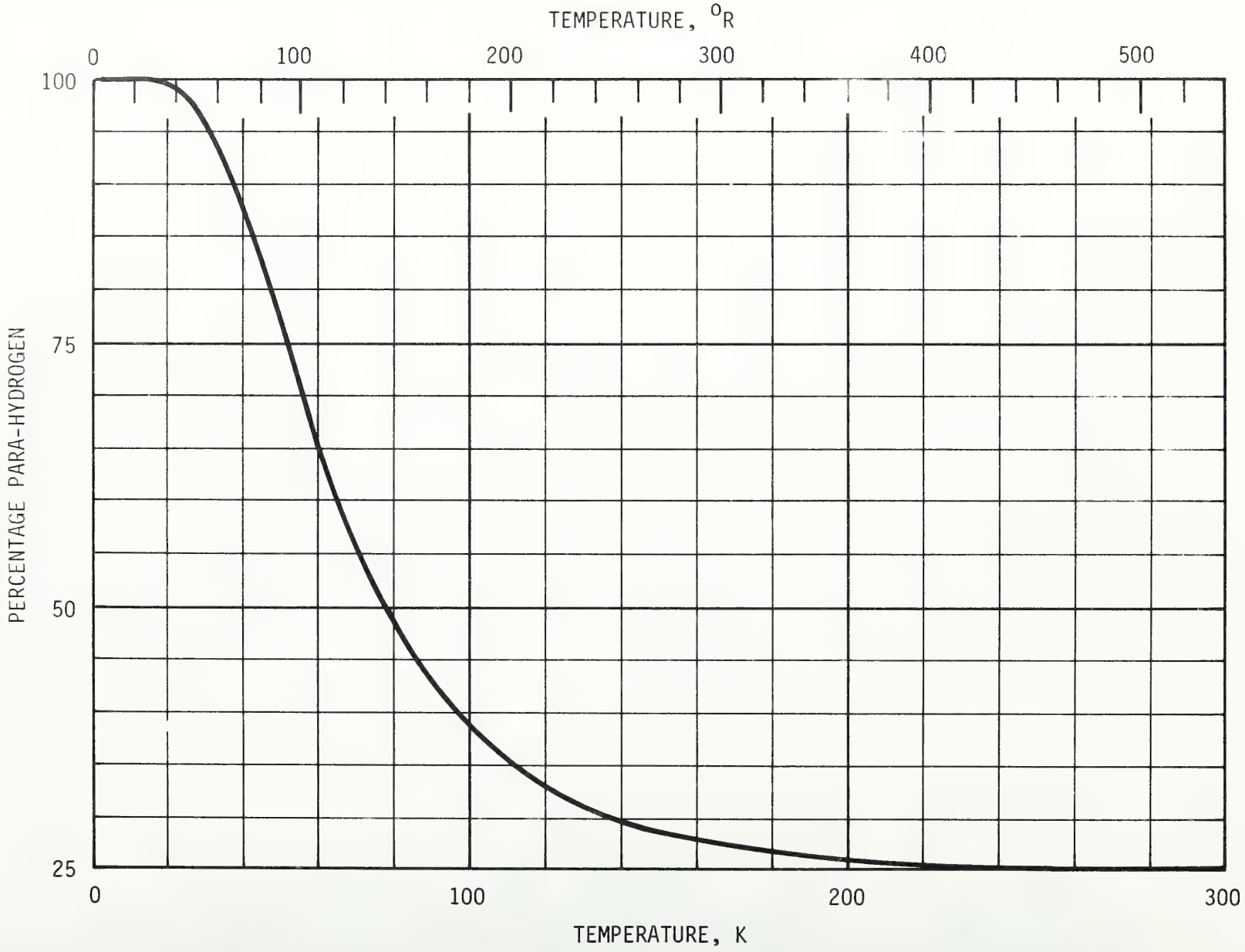


FIGURE 54. Equilibrium percentage of parahydrogen.

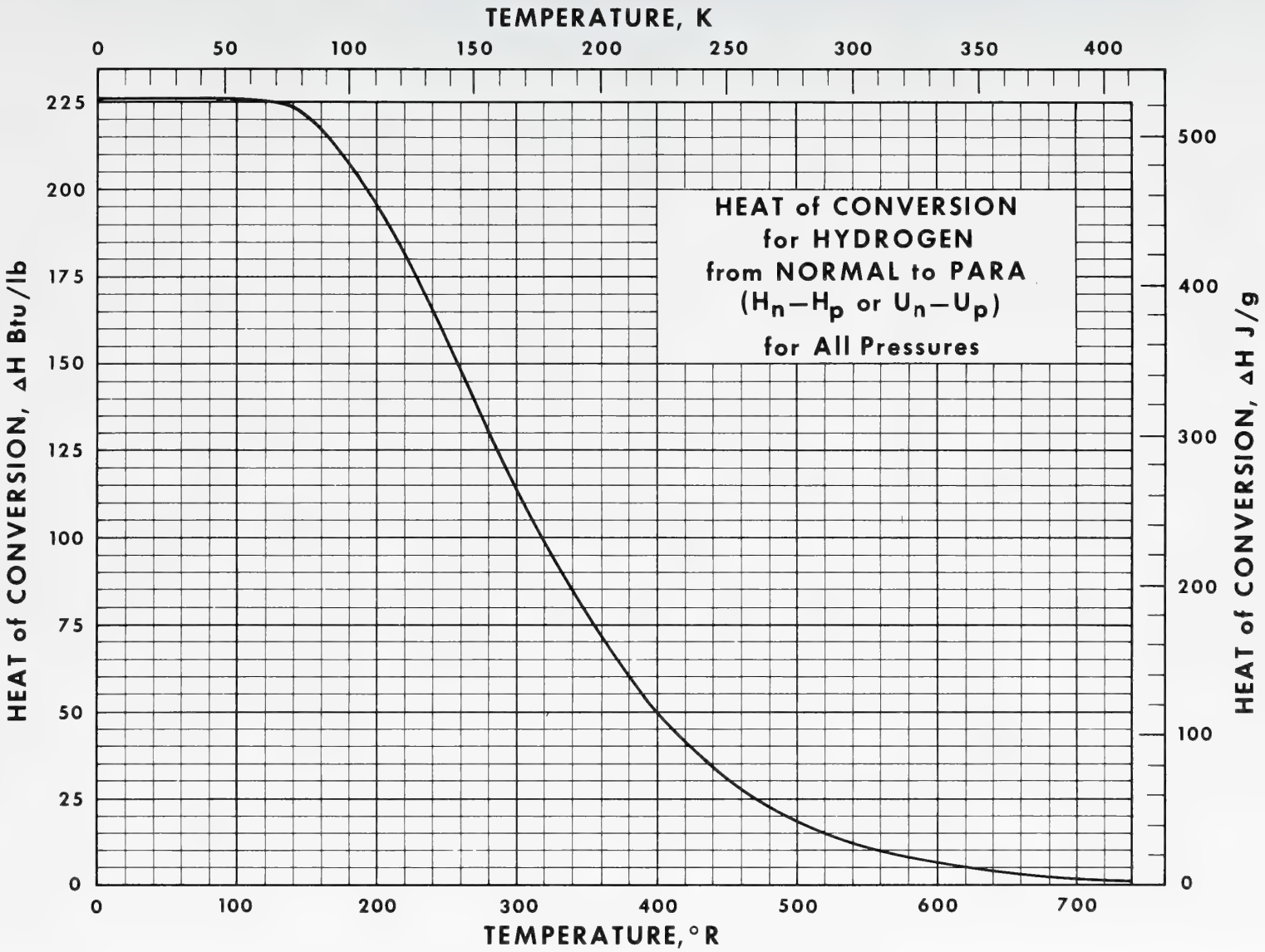


FIGURE 55. Heat of conversion for hydrogen from normal to para.

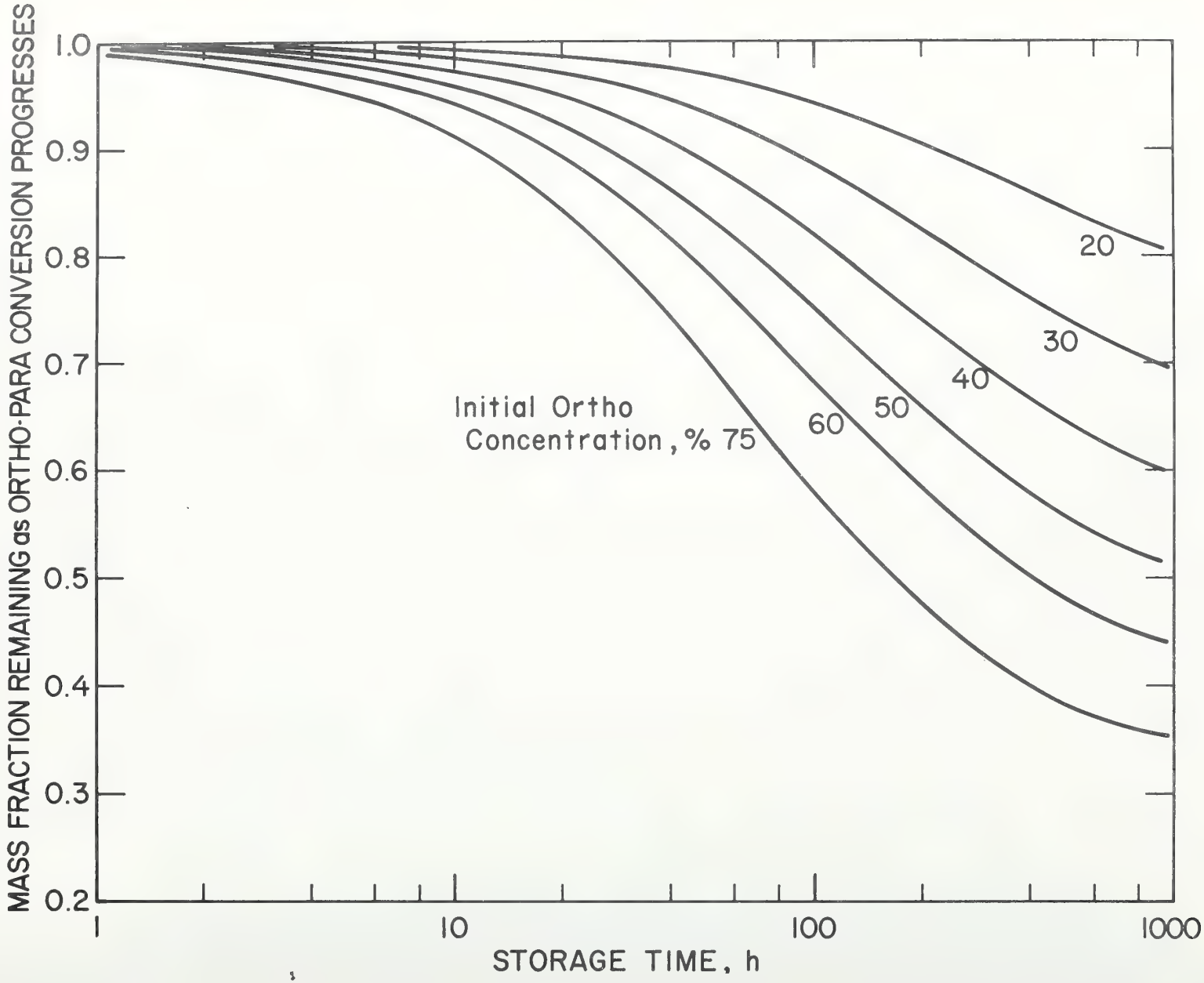


FIGURE 56. Fraction of liquid hydrogen boiled off, due to ortho-para conversion, as a function of time.

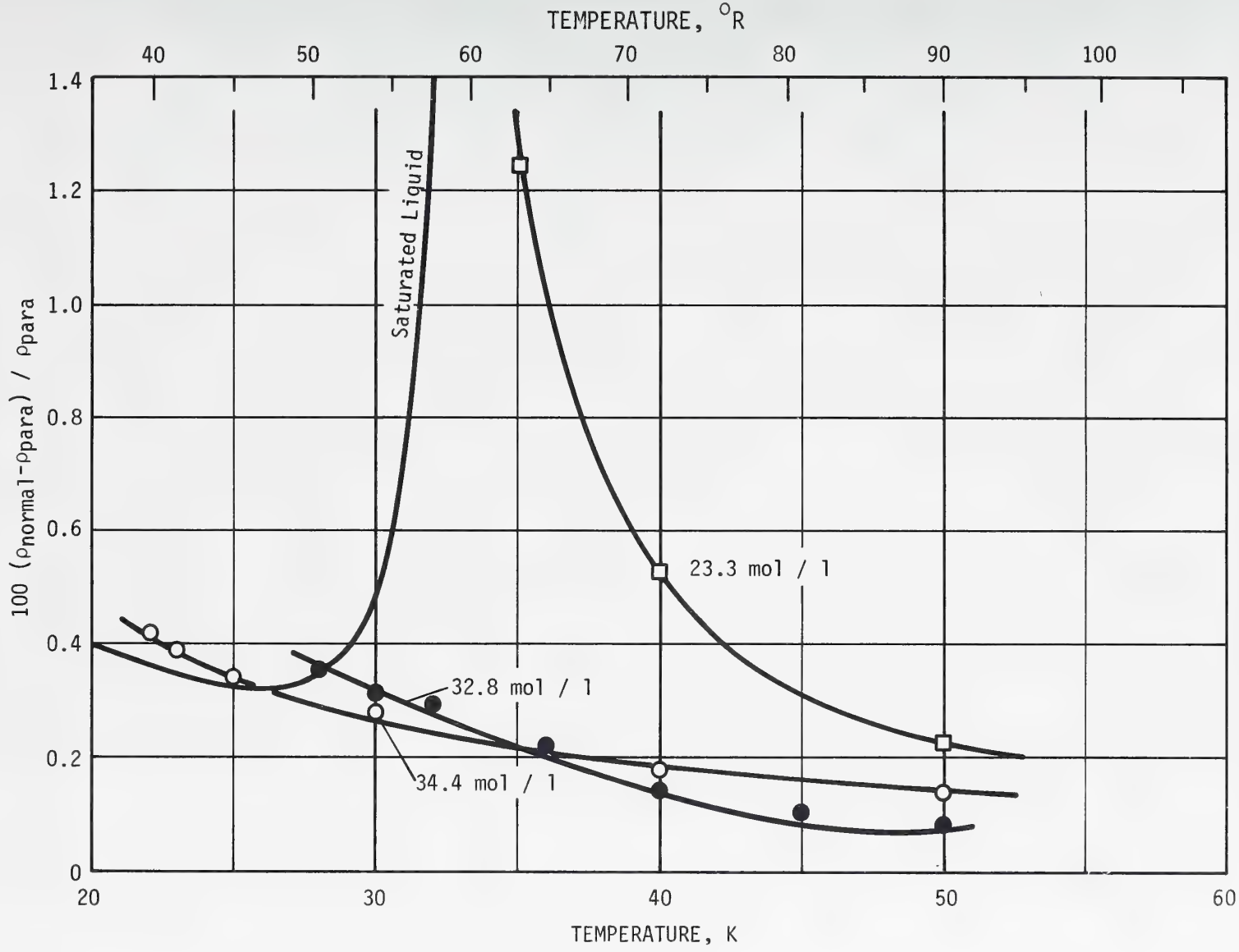


FIGURE 57. Density differences between normal and parahydrogen.

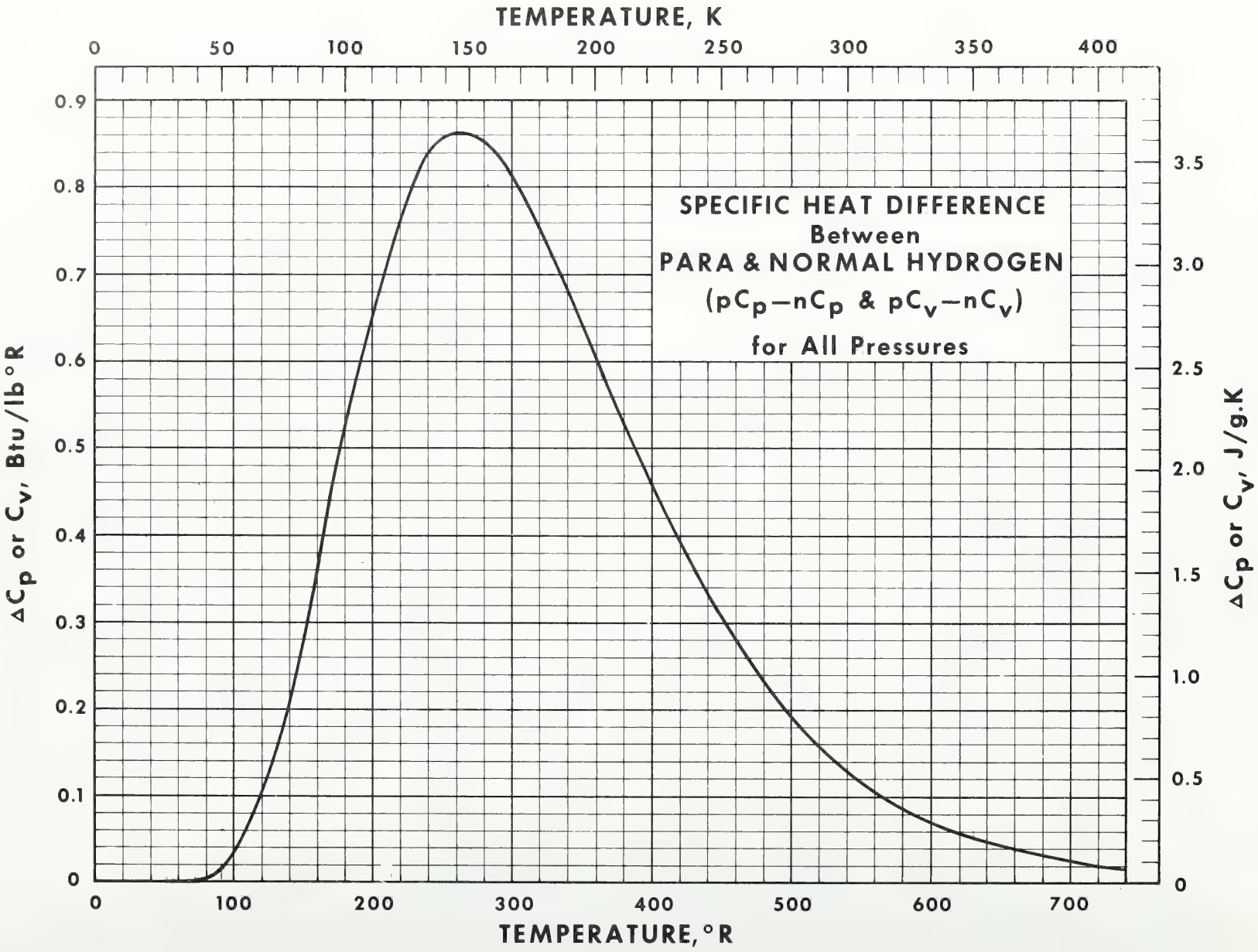


FIGURE 58. Differences in specific heat (heat capacity) between para and normal hydrogen.

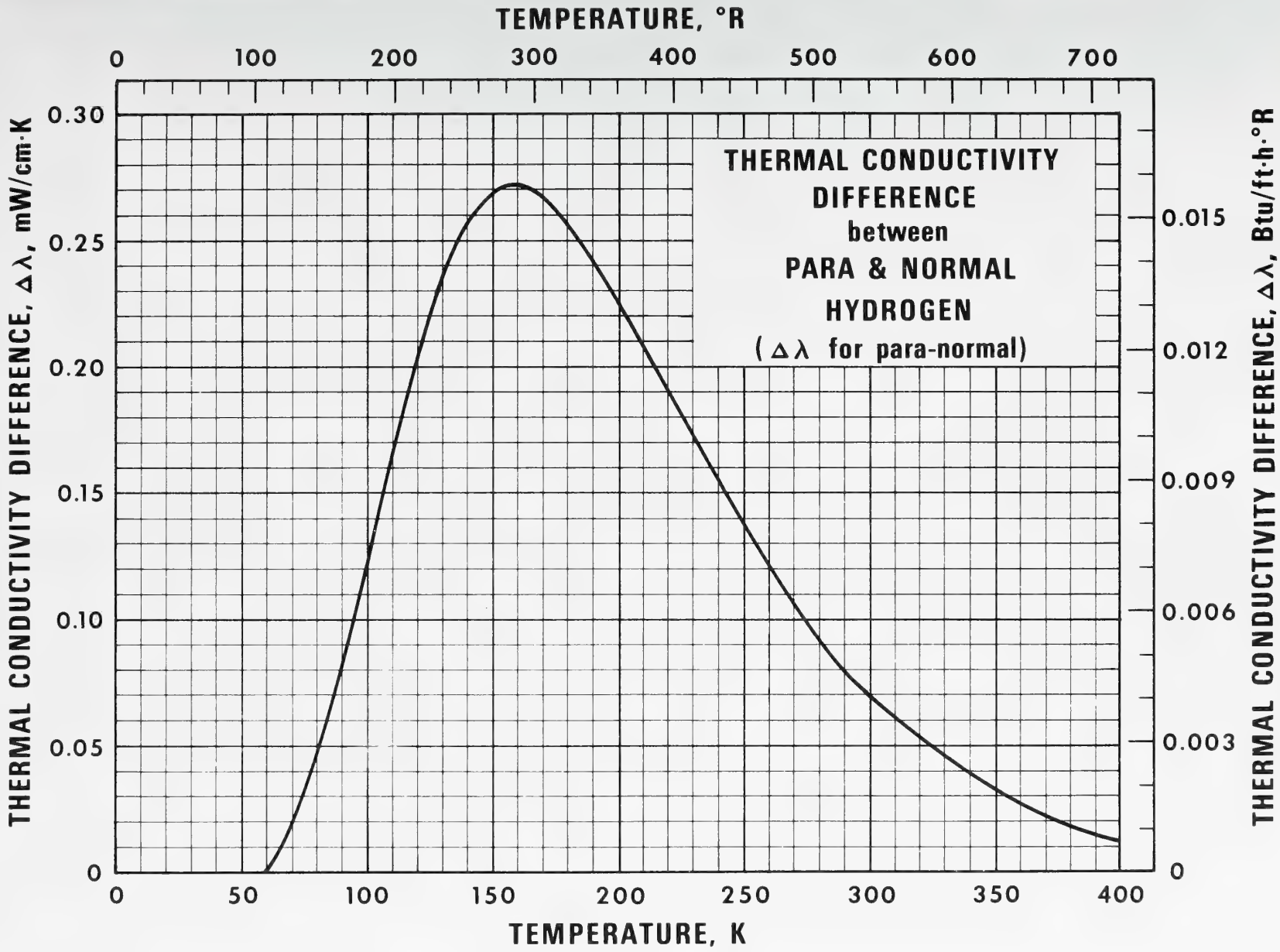


FIGURE 59. Differences in thermal conductivity between para and normal hydrogen (invariant with pressure).

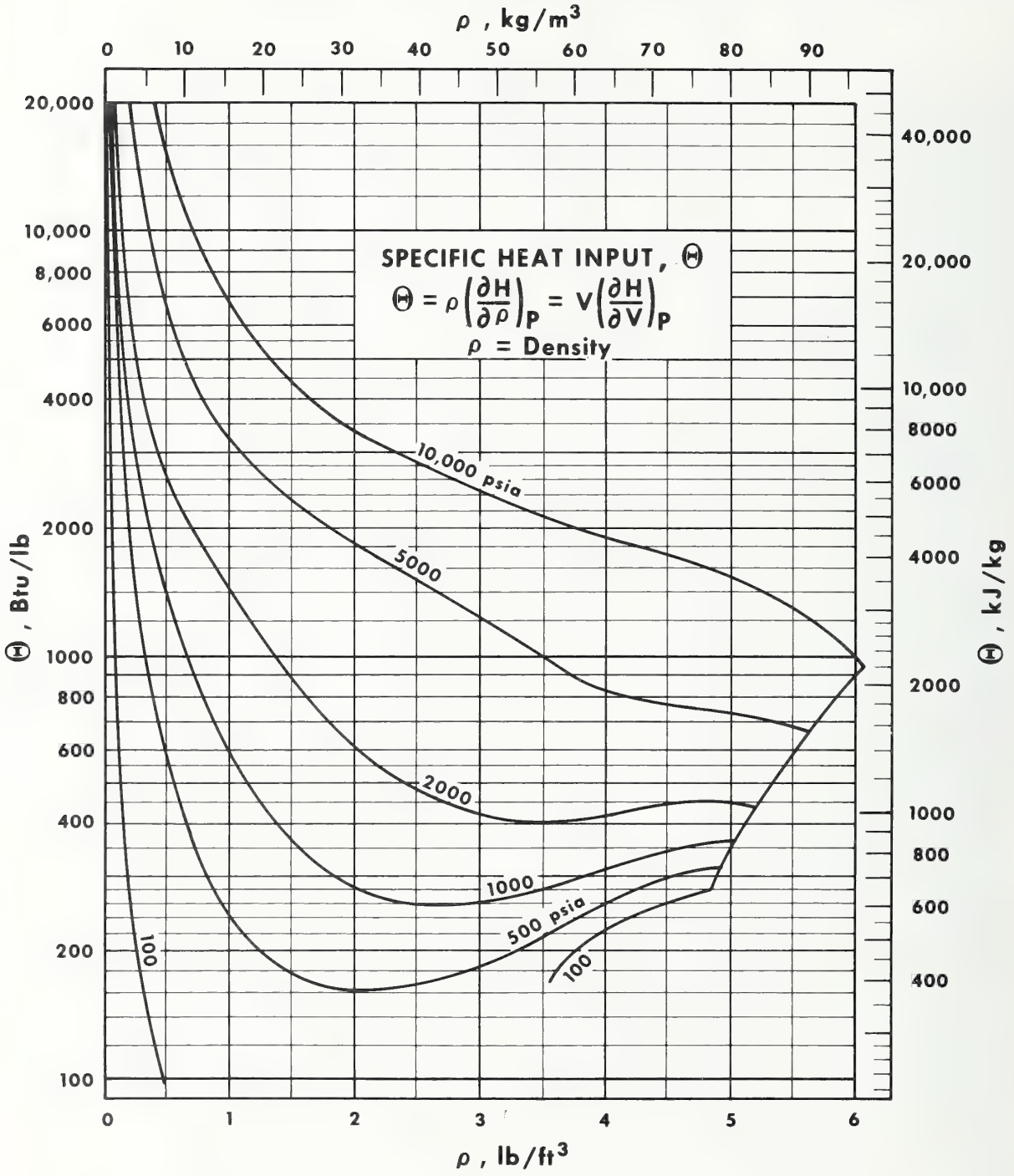


FIGURE 60. Specific heat input function for hydrogen.

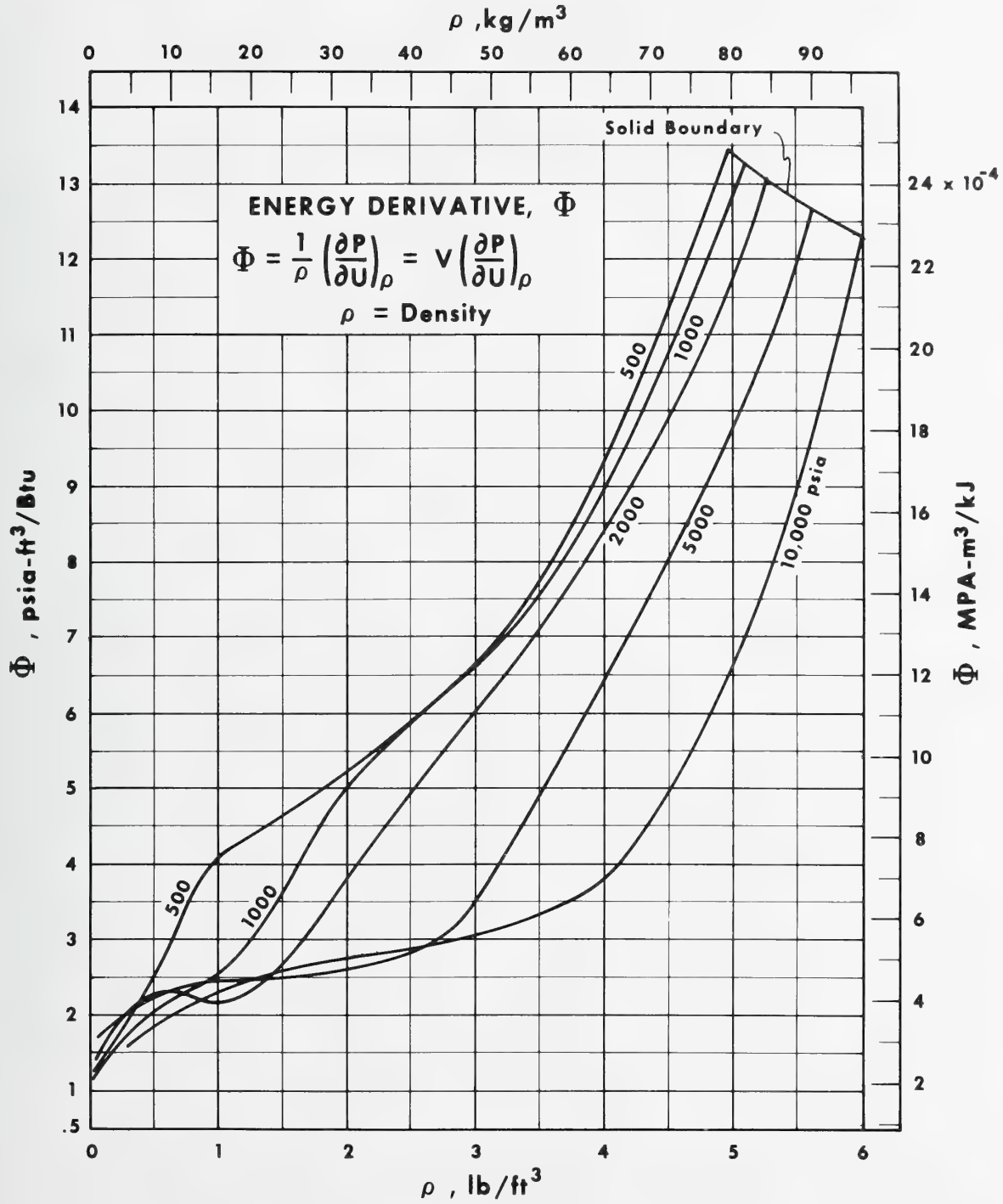


FIGURE 61. Energy derivative function for hydrogen.

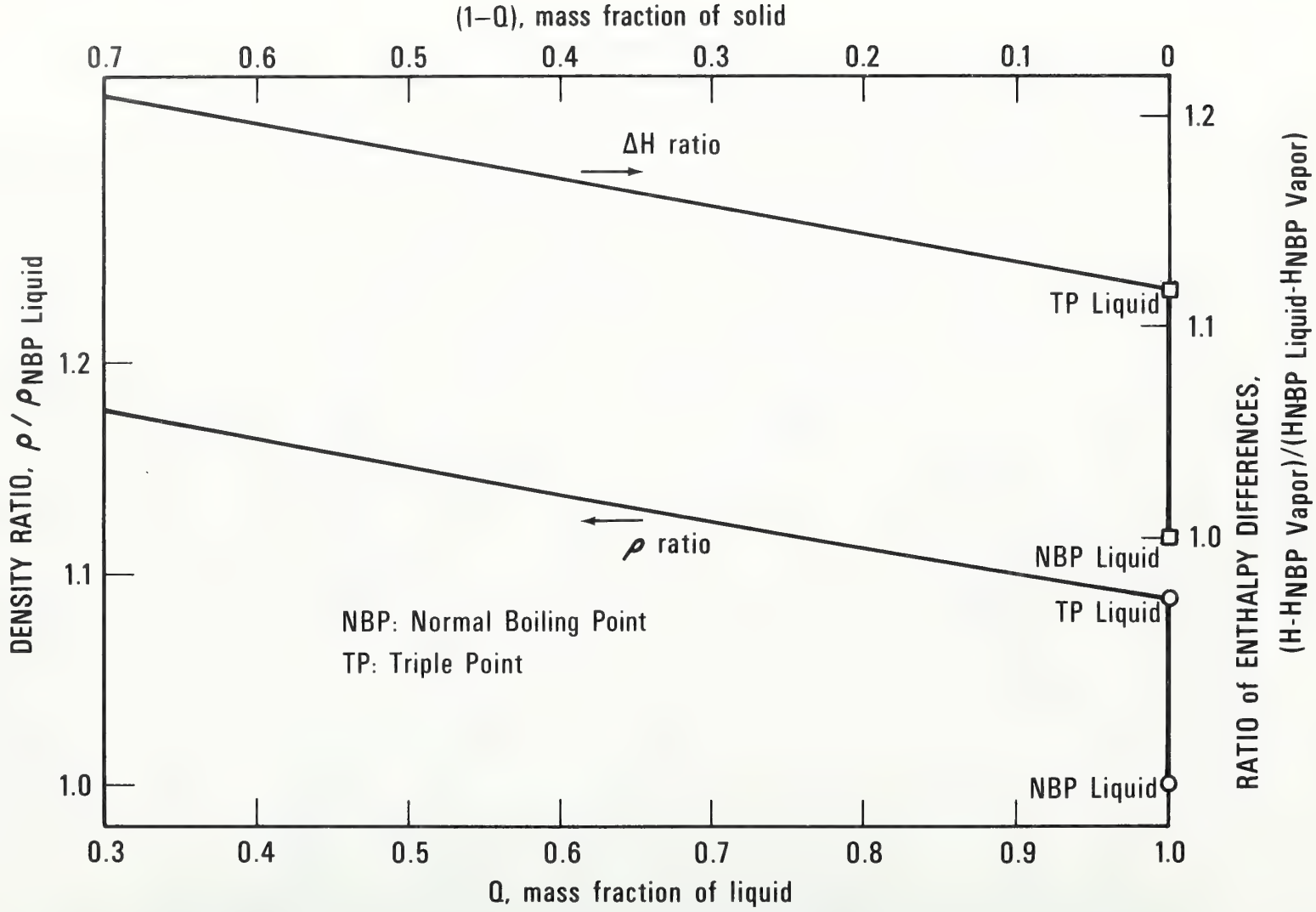


FIGURE 62. Comparison of densities and bulk fluid heat capacities for slush, triple-point liquid, and normal boiling liquid parahydrogen.

CHAPTER SIX

DATA TABLES

Table 1
MAJOR COMPUTER PROGRAMS FOR HYDROGEN FLUID PROPERTIES

Program name	1[a] Type	2 P-T range	3 List of properties	4 Accuracy	5 Availability	6 Continuous	7 Modifications	8 Input
Tab Code[2]	Linear interpolation	0-35 MPa 14-3300 K	P,T,ρ,H,S,λ,η,ω C_p,C_v	1% average	NBS[c] Cryogenic Data Center	No	Para and equilibrium	P,T and P,H
H_2 Props[104,105]	33-term MBWR	0-83 MPa 14-1100 K	P, T,ρ,H,S C_p,C_v,ω	0.1% average	NBS Cryogenic Data Center	Yes	Para, ortho, equilibrium, and normal	P,T or ρ,T
H_2 Gen[b,4,7,8]	Polynomial interpolation	0-103 MPa 14-3300 K	P,T,ρ,H,S,λ,η,ω C_p,C_v,E,γ,RI,ε	Better than 0.1% average	NBS Cryogenic Data Center	No	Para	P,T
GASP[5]	20-term MBWR	0-83 MPa 14-1100 K	P,T,ρ,H,S,γ,η C_p,C_v,ω,$\frac{\partial P}{\partial \rho}\frac{\partial P}{\partial T}$	0.1% average	NASA[d]	Yes	Para	(P,T)(ρ,T) (T,ρ)(H,P) (S,P)

[a]Numbers refer to Column explanations in text.

[b]This program was used to produce the tables in Chapter 6 and to generate tabular data in Reference 6. Also, Reference 4 is an updated modification of Reference 3.

[c]Cryogenic Data Center, Thermophysical Properties Division, National Bureau of Standards, Boulder, Colorado 80303.

[d]Lewis Research Center, National Aeronautics and Space Administration, 21000 Brookpark Road, Cleveland, Ohio 44135.

TABLE 2

Thermodynamic Properties of Parahydrogen
(Isobars, SI Units)

0.01 to 100 MPa Isobars
13.8 to 3000 K

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.01 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.804	.01298	1.1628	.9233	-308.9	-308.8	4.966	4.67	6.38	1260.
	14.	.01301	1.1302	.9233	-307.6	-307.5	5.059	4.72	6.50	1248.
*	14.430	.01307	1.1173	.9196	-304.8	-304.7	5.259	4.80	6.57	1245.
*	14.430	5.83386	.0571	.0007	87.7	146.0	36.498	6.22	10.59	312.
	15.	6.07554	.0596	.0007	91.3	152.1	36.907	6.22	10.56	318.
	16.	6.49796	.0640	.0006	97.6	162.6	37.587	6.21	10.52	329.
	17.	6.91887	.0683	.0006	103.9	173.1	38.224	6.20	10.49	340.
	18.	7.33861	.0725	.0006	110.2	183.6	38.822	6.20	10.46	350.
	19.	7.75743	.0768	.0005	116.4	194.0	39.388	6.20	10.44	360.
	20.	8.17550	.0810	.0005	122.7	204.5	39.923	6.20	10.43	369.
	21.	8.59295	.0852	.0005	128.9	214.9	40.431	6.20	10.42	379.
	22.	9.00988	.0895	.0005	135.2	225.3	40.916	6.20	10.41	388.
	23.	9.42636	.0937	.0004	141.4	235.7	41.378	6.20	10.40	396.
	24.	9.84245	.0979	.0004	147.7	246.1	41.820	6.19	10.39	405.
	25.	10.25822	.1021	.0004	153.9	256.5	42.244	6.19	10.38	414.
	26.	10.67369	.1062	.0004	160.1	266.8	42.651	6.19	10.38	422.
	27.	11.08891	.1104	.0004	166.3	277.2	43.043	6.19	10.37	430.
	28.	11.50391	.1146	.0004	172.6	287.6	43.420	6.19	10.37	438.
	29.	11.91870	.1188	.0003	178.8	298.0	43.784	6.19	10.36	446.
	30.	12.33332	.1229	.0003	185.0	308.3	44.135	6.19	10.36	453.
	31.	12.74778	.1271	.0003	191.2	318.7	44.475	6.19	10.36	461.
	32.	13.16210	.1313	.0003	197.4	329.0	44.803	6.19	10.35	468.
	33.	13.57629	.1354	.0003	203.6	339.4	45.122	6.19	10.35	476.
	34.	13.99036	.1396	.0003	209.8	349.7	45.431	6.19	10.35	483.
	36.	14.81819	.1479	.0003	222.2	370.4	46.022	6.19	10.34	497.
	38.	15.64568	.1562	.0003	234.7	391.1	46.581	6.20	10.34	511.
	40.	16.47288	.1645	.0003	247.1	411.8	47.112	6.20	10.35	524.
	42.	17.29983	.1728	.0002	259.5	432.5	47.617	6.21	10.35	537.
	44.	18.12657	.1811	.0002	271.9	453.2	48.099	6.21	10.36	549.
	46.	18.95313	.1893	.0002	284.4	473.9	48.559	6.23	10.37	561.
	48.	19.77953	.1976	.0002	296.9	494.7	49.001	6.25	10.38	573.
	50.	20.60580	.2059	.0002	309.4	515.5	49.425	6.27	10.41	585.
	52.	21.43196	.2142	.0002	322.0	536.3	49.834	6.30	10.43	596.
	56.	23.08396	.2307	.0002	347.4	578.2	50.610	6.38	10.51	617.
	60.	24.73564	.2472	.0002	373.1	620.5	51.339	6.49	10.62	636.
	65.	26.79987	.2679	.0002	406.0	674.0	52.196	6.68	10.82	658.
	70.	28.86380	.2886	.0001	440.1	728.7	53.007	6.93	11.07	679.
	75.	30.92747	.3092	.0001	475.5	784.8	53.780	7.24	11.37	697.
	80.	32.99095	.3299	.0001	512.6	842.5	54.525	7.59	11.72	714.
	90.	37.11746	.3711	.0001	592.5	963.7	55.952	8.41	12.53	744.
	100.	41.24353	.4124	.0001	680.9	1093.4	57.317	9.27	13.40	772.
	110.	45.36928	.4537	.0001	777.8	1231.5	58.630	10.10	14.23	799.
	120.	49.49480	.4950	.0001	882.6	1377.5	59.901	10.83	14.95	827.
	130.	53.62013	.5362	.0001	993.8	1530.0	61.121	11.40	15.53	855.
	140.	57.74534	.5775	.0001	1110.1	1687.5	62.288	11.82	15.94	883.
	160.	65.99544	.6600	.0001	1351.2	2011.2	64.449	12.21	16.34	940.
	180.	74.24525	.7425	.0001	1595.7	2338.2	66.375	12.19	16.31	997.
	200.	82.49487	.8250	.0001	1837.2	2662.2	68.081	11.94	16.07	1053.
	220.	90.74435	.9075	.0000	2073.0	2980.5	69.598	11.63	15.76	1109.
	240.	98.99373	.9900	.0000	2302.5	3292.5	70.955	11.33	15.45	1162.
	260.	107.24303	1.0725	.0000	2526.5	3598.9	72.182	11.07	15.20	1213.
	280.	115.49227	1.1550	.0000	2745.8	3900.7	73.301	10.87	15.00	1262.
	300.	123.73215	1.2374	.0000	2961.7	4199.0	74.330	10.72	14.84	1309.
	350.	144.35340	1.4436	.0000	3491.6	4935.1	76.598	10.51	14.63	1418.
	400.	164.97452	1.6498	.0000	4014.6	5664.3	78.547	10.42	14.55	1517.
	450.	185.59556	1.8560	.0000	4534.8	6390.8	80.260	10.40	14.53	1610.
	500.	206.21654	2.0622	.0000	5055.1	7117.3	81.789	10.40	14.52	1697.
	550.	226.83749	2.2685	.0000	5575.1	7843.5	83.174	10.41	14.53	1780.
	600.	247.45841	2.4747	.0000	6096.1	8570.6	84.437	10.42	14.55	1858.
	700.	288.70020	2.8871	.0000	7141.0	10028.0	86.685	10.48	14.61	2006.
	800.	329.94195	3.2995	.0000	8193.4	11492.9	88.640	10.57	14.70	2142.
	900.	371.18367	3.7119	.0000	9256.8	12968.6	90.376	10.70	14.82	2268.
	1000.	412.42538	4.1243	.0000	10334.0	14458.2	91.949	10.86	14.98	2386.
	1200.	494.90891	4.9492	.0000	12544.2	17493.3	94.702	11.24	15.37	2601.
	1400.	577.39658	5.7740	.0000	14838.3	20612.3	97.110	11.70	15.83	2795.
	1600.	659.93251	6.5988	.0000	17233.3	23832.7	99.237	12.28	16.42	2970.
	1800.	742.78144	7.4237	.0000	19799.6	27227.4	101.197	13.46	17.66	3121.
	2000.	826.97486	8.2485	.0000	22778.4	31048.1	103.273	16.49	20.91	3235.
	2200.	915.44934	9.0733	.0000	26764.6	35919.1	106.261	23.62	28.72	3322.
	2400.	1014.83413	9.8982	.0000	32969.2	43117.5	110.429	38.05	44.31	3417.
	2600.	1137.61448	10.7230	.0000	43400.4	54776.5	116.383	63.16	74.13	3545.
	2800.	1303.75995	11.5478	.0000	60877.2	73914.8	124.850	100.49	120.06	3710.
	3000.	1538.60332	12.3727	.0000	88375.8	103761.9	136.424	145.32	179.51	3904.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.01 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.804	77.0167	618.8	.25650	89.5531	.01031	72.63	254.83	.00053	1.25158	2.2385
14.	76.8435	611.8	.25478	86.8501	.01063	74.61	247.76	.00054	1.25097	2.1598
* 14.430	76.4900	620.0	.25021	85.4586	.01076	78.59	234.09	.00055	1.24972	1.9873
* 14.430	.1714	145.5	.06684	.0098	.07279	12.77	7.74	.02532	1.00052	.6420
15.	.1646	151.5	.06684	.0098	.06968	13.01	8.07	.02696	1.00050	.6546
16.	.1539	162.1	.06684	.0098	.06488	13.45	8.64	.02992	1.00046	.6756
17.	.1445	172.6	.06683	.0099	.06074	13.89	9.21	.03300	1.00044	.6949
18.	.1363	183.1	.06681	.0099	.05713	14.40	9.77	.03635	1.00041	.7099
19.	.1289	193.6	.06680	.0099	.05394	14.90	10.32	.03985	1.00039	.7235
20.	.1223	204.1	.06679	.0099	.05109	15.53	10.87	.04382	1.00037	.7303
21.	.1164	214.6	.06678	.0099	.04855	16.32	11.41	.04846	1.00035	.7286
22.	.1110	225.0	.06677	.0099	.04625	17.11	11.95	.05334	1.00033	.7267
23.	.1061	235.4	.06676	.0099	.04416	17.91	12.48	.05844	1.00032	.7247
24.	.1016	245.9	.06675	.0099	.04226	18.70	13.01	.06378	1.00031	.7225
25.	.0975	256.3	.06675	.0099	.04051	19.49	13.52	.06934	1.00029	.7202
26.	.0937	266.7	.06674	.0100	.03891	20.28	14.04	.07510	1.00028	.7181
27.	.0902	277.1	.06674	.0100	.03743	21.07	14.54	.08109	1.00027	.7159
28.	.0869	287.4	.06673	.0100	.03606	21.85	15.04	.08730	1.00026	.7136
29.	.0839	297.8	.06673	.0100	.03479	22.64	15.54	.09374	1.00025	.7112
30.	.0811	308.2	.06672	.0100	.03361	23.42	16.03	.10040	1.00024	.7088
31.	.0784	318.6	.06672	.0100	.03251	24.12	16.51	.10690	1.00024	.7089
32.	.0760	328.9	.06671	.0100	.03147	24.82	16.99	.11359	1.00023	.7088
33.	.0737	339.3	.06671	.0100	.03050	25.51	17.47	.12049	1.00022	.7085
34.	.0715	349.7	.06670	.0100	.02959	26.22	17.93	.12761	1.00022	.7078
36.	.0675	370.4	.06668	.0100	.02793	27.63	18.86	.14247	1.00020	.7061
38.	.0639	391.2	.06665	.0100	.02644	29.04	19.76	.15812	1.00019	.7041
40.	.0607	412.1	.06660	.0100	.02510	30.45	20.65	.17454	1.00018	.7017
42.	.0578	433.1	.06653	.0100	.02390	31.85	21.53	.19166	1.00017	.6994
44.	.0552	454.2	.06643	.0100	.02280	33.25	22.38	.20950	1.00017	.6971
46.	.0528	475.5	.06628	.0100	.02180	34.65	23.22	.22802	1.00016	.6949
48.	.0506	497.1	.06609	.0100	.02089	36.05	24.05	.24720	1.00015	.6927
50.	.0485	519.1	.06585	.0100	.02005	37.45	24.86	.26696	1.00015	.6908
52.	.0467	541.4	.06554	.0100	.01927	38.85	25.66	.28725	1.00014	.6893
56.	.0433	587.7	.06471	.0100	.01789	41.65	27.22	.32922	1.00013	.6872
60.	.0404	636.5	.06357	.0100	.01669	44.51	28.74	.37306	1.00012	.6861
65.	.0373	702.2	.06174	.0100	.01540	48.38	30.58	.43162	1.00011	.6836
70.	.0346	773.8	.05950	.0100	.01430	52.26	32.36	.49076	1.00010	.6852
75.	.0323	852.1	.05699	.0100	.01334	56.13	34.09	.54958	1.00010	.6905
80.	.0303	937.2	.05433	.0100	.01251	60.04	35.77	.60829	1.00009	.6985
90.	.0269	1127.4	.04909	.0100	.01112	69.96	39.01	.74586	1.00008	.6988
100.	.0242	1339.5	.04450	.0100	.01000	79.87	42.10	.89510	1.00007	.7062
110.	.0220	1564.7	.04084	.0100	.00909	92.12	44.74	1.05750	1.00007	.6910
120.	.0202	1793.9	.03811	.0100	.00833	102.77	47.58	1.22467	1.00006	.6922
130.	.0186	2018.2	.03618	.0100	.00769	112.82	50.33	1.40262	1.00006	.6926
140.	.0173	2231.9	.03491	.0100	.00714	121.77	53.00	1.58779	1.00005	.6939
160.	.0152	2613.6	.03378	.0100	.00625	136.35	58.14	1.98308	1.00005	.6965
180.	.0135	2935.8	.03385	.0100	.00556	147.52	63.06	2.41750	1.00004	.6972
200.	.0121	3213.9	.03453	.0100	.00500	156.62	67.80	2.89449	1.00004	.6956
220.	.0110	3466.4	.03546	.0100	.00455	164.59	72.38	3.41274	1.00003	.6928
240.	.0101	3708.8	.03641	.0100	.00417	172.05	76.82	3.96798	1.00003	.6900
260.	.0093	3951.5	.03725	.0100	.00385	179.32	81.15	4.55552	1.00003	.6877
280.	.0087	4199.1	.03794	.0100	.00357	186.57	85.36	5.17287	1.00003	.6861
300.	.0081	4453.3	.03848	.0100	.00333	193.88	89.48	5.81800	1.00002	.6851
350.	.0069	5121.4	.03925	.0100	.00286	212.50	99.40	7.54703	1.00002	.6844
400.	.0061	5819.8	.03956	.0100	.00250	231.39	108.86	9.44559	1.00002	.6845
450.	.0054	6538.4	.03964	.0100	.00222	250.24	117.95	11.50740	1.00002	.6848
500.	.0048	7262.3	.03966	.0100	.00200	268.83	126.70	13.74060	1.00001	.6845
550.	.0044	7993.3	.03962	.0100	.00182	287.08	135.18	16.13138	1.00001	.6843
600.	.0040	8729.7	.03956	.0100	.00167	305.01	143.40	18.67624	1.00001	.6840
700.	.0035	10223.8	.03935	.0100	.00143	340.16	159.23	24.20609	1.00001	.6837
800.	.0030	11757.5	.03901	.0100	.00125	374.85	174.35	30.29554	1.00001	.6836
900.	.0027	13341.4	.03855	.0100	.00111	409.59	188.89	36.92235	1.00001	.6836
1000.	.0024	14983.1	.03798	.0100	.00100	444.68	202.95	44.06646	1.00001	.6838
1200.	.0020	18442.2	.03668	.0100	.00083	511.19	229.87	59.26340	1.00001	.6911
1400.	.0017	22156.4	.03525	.0100	.00071	584.62	255.49	76.78658	1.00001	.6916
1600.	.0015	26269.7	.03358	.0100	.00063	668.03	280.05	96.65688	1.00000	.6883
1800.	.0013	31767.5	.03065	.0100	.00056	800.59	303.70	121.23303	1.00000	.6699
2000.	.0012	41718.6	.02508	.0100	.00050	1099.16	326.65	156.47369	1.00000	.6215
2200.	.0011	62633.3	.01762	.0099	.00046	1809.21	345.83	207.57597	1.00000	.5491
2400.	.0010	105137.6	.01111	.0098	.00043	3327.26	369.24	270.64373	1.00000	.4984
2600.	.0009	181673.2	.00693	.0094	.00041	6112.35	394.59	337.68331	1.00000	.4786
2800.	.0008	297765.7	.00463	.0089	.00040	10361.10	421.87	405.03496	1.00000	.4389
3000.	.0006	433048.8	.00353	.0080	.00041	15311.58	447.27	472.46613	1.00000	.5244

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.02 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.807	.01298	1.1634	.9234	-308.9	-308.7	4.966	4.67	6.38	1260.
14.	.01301	1.1318	.9234	-307.6	-307.4	5.058	4.72	6.50	1249.
15.	.01315	1.0325	.9076	-300.9	-300.7	5.520	4.92	6.99	1211.
* 15.832	.01329	1.0154	.8919	-294.9	-294.7	5.911	5.09	7.28	1205.
* 15.832	3.15931	.0610	.0013	95.0	158.2	34.518	6.27	10.81	325.
16.	3.19578	.0618	.0013	96.1	160.0	34.632	6.26	10.80	326.
17.	3.41127	.0663	.0012	102.5	170.8	35.284	6.24	10.71	337.
18.	3.62529	.0708	.0011	108.9	181.4	35.894	6.23	10.64	348.
19.	3.83822	.0752	.0011	115.3	192.1	36.468	6.22	10.59	358.
20.	4.05030	.0795	.0010	121.6	202.6	37.010	6.21	10.56	368.
21.	4.26168	.0839	.0010	128.0	213.2	37.525	6.21	10.53	377.
22.	4.47250	.0882	.0009	134.3	223.7	38.014	6.21	10.51	386.
23.	4.68285	.0925	.0009	140.5	234.2	38.481	6.21	10.49	395.
24.	4.89279	.0967	.0008	146.8	244.7	38.927	6.20	10.47	404.
25.	5.10238	.1010	.0008	153.1	255.1	39.354	6.20	10.46	413.
26.	5.31167	.1052	.0008	159.4	265.6	39.764	6.20	10.44	421.
27.	5.52070	.1095	.0008	165.6	276.0	40.157	6.20	10.43	429.
28.	5.72950	.1137	.0007	171.9	286.5	40.537	6.20	10.42	437.
29.	5.93809	.1179	.0007	178.1	296.9	40.902	6.20	10.41	445.
30.	6.14651	.1221	.0007	184.4	307.3	41.255	6.20	10.41	453.
31.	6.35476	.1263	.0007	190.6	317.7	41.596	6.20	10.40	460.
32.	6.56286	.1305	.0006	196.8	328.1	41.926	6.20	10.39	468.
33.	6.77084	.1347	.0006	203.1	338.5	42.246	6.20	10.39	475.
34.	6.97869	.1389	.0006	209.3	348.9	42.556	6.20	10.38	482.
36.	7.39410	.1473	.0006	221.7	369.6	43.150	6.20	10.38	497.
38.	7.80915	.1556	.0005	234.2	391.4	43.710	6.20	10.37	510.
40.	8.22390	.1640	.0005	246.6	411.1	44.242	6.20	10.37	524.
42.	8.63841	.1723	.0005	259.1	431.9	44.748	6.21	10.37	537.
44.	9.05271	.1806	.0005	271.6	452.6	45.231	6.22	10.38	549.
46.	9.46683	.1889	.0004	284.0	473.4	45.692	6.23	10.39	561.
48.	9.88078	.1973	.0004	296.5	494.2	46.135	6.25	10.40	573.
50.	10.29461	.2056	.0004	309.1	515.0	46.560	6.27	10.42	584.
52.	10.70831	.2139	.0004	321.7	535.8	46.969	6.30	10.45	596.
56.	11.53542	.2304	.0004	347.1	577.8	47.746	6.38	10.52	617.
60.	12.36221	.2470	.0003	372.8	620.1	48.475	6.49	10.63	636.
65.	13.39533	.2677	.0003	405.8	673.7	49.334	6.68	10.82	658.
70.	14.42813	.2884	.0003	439.9	728.4	50.145	6.94	11.07	679.
75.	15.46069	.3091	.0003	475.3	784.5	50.919	7.24	11.38	697.
80.	16.49305	.3298	.0003	512.4	842.3	51.664	7.59	11.73	714.
90.	18.55732	.3711	.0002	592.4	963.5	53.091	8.41	12.54	744.
100.	20.62115	.4124	.0002	680.8	1093.2	54.457	9.27	13.40	772.
110.	22.68466	.4537	.0002	777.7	1231.4	55.771	10.10	14.23	799.
120.	24.74793	.4950	.0002	882.4	1377.4	57.041	10.83	14.95	827.
130.	26.81103	.5363	.0002	993.7	1529.9	58.262	11.40	15.53	855.
140.	28.87400	.5775	.0001	1110.0	1687.4	59.428	11.82	15.94	883.
160.	32.99962	.6601	.0001	1351.2	2011.1	61.589	12.21	16.34	940.
180.	37.12496	.7426	.0001	1595.7	2338.2	63.516	12.19	16.31	997.
200.	41.25010	.8251	.0001	1837.2	2662.2	65.222	11.94	16.07	1054.
220.	45.37510	.9076	.0001	2073.0	2980.5	66.739	11.63	15.76	1109.
240.	49.50000	.9901	.0001	2302.5	3292.5	68.096	11.33	15.45	1162.
260.	53.62482	1.0726	.0001	2526.4	3598.9	69.323	11.07	15.20	1213.
280.	57.74958	1.1551	.0001	2745.8	3900.8	70.442	10.87	15.00	1262.
300.	61.86966	1.2375	.0001	2961.7	4199.0	71.471	10.72	14.84	1309.
350.	72.18050	1.4438	.0001	3491.6	4935.2	73.740	10.51	14.63	1418.
400.	82.49121	1.6500	.0001	4014.6	5664.4	75.689	10.42	14.55	1517.
450.	92.80183	1.8562	.0000	4534.8	6390.8	77.401	10.40	14.53	1610.
500.	103.11240	2.0624	.0000	5055.1	7117.4	78.930	10.40	14.52	1697.
550.	113.42293	2.2686	.0000	5575.1	7843.5	80.315	10.41	14.53	1780.
600.	123.73343	2.4748	.0000	6096.0	8570.7	81.579	10.42	14.55	1858.
700.	144.35440	2.8873	.0000	7141.0	10028.0	83.826	10.48	14.61	2006.
800.	164.97531	3.2997	.0000	8193.4	11492.9	85.781	10.57	14.70	2142.
900.	185.59621	3.7121	.0000	9256.8	12968.7	87.518	10.70	14.82	2268.
1000.	206.21708	4.1245	.0000	10333.9	14458.3	89.090	10.86	14.98	2386.
1200.	247.45886	4.9494	.0000	12544.2	17493.4	91.843	11.24	15.37	2601.
1400.	288.70068	5.7742	.0000	14837.9	20611.9	94.251	11.69	15.82	2795.
1600.	329.96236	6.5990	.0000	17227.8	23827.1	96.374	12.23	16.36	2971.
1800.	371.33330	7.4239	.0000	19763.5	27190.1	98.316	13.17	17.34	3127.
2000.	413.17959	8.2487	.0000	22614.2	30877.7	100.323	15.41	19.75	3251.
2200.	456.53955	9.0735	.0000	26196.3	35327.1	103.112	20.56	25.37	3346.
2400.	503.75825	9.8984	.0000	31366.4	41441.5	106.811	30.91	36.92	3437.
2600.	559.26734	10.7232	.0000	39549.8	50735.2	111.823	49.06	57.76	3551.
2800.	630.28760	11.5480	.0000	52797.1	65402.8	118.639	76.80	91.12	3698.
3000.	726.79296	12.3729	.0000	73552.5	88088.4	127.747	113.04	137.57	3875.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.02 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial V)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.807	77.0224	619.1	.25649	89.6087	.01031	72.67	254.89	.00053	1.25160	2.2378
14.	76.8522	612.4	.25479	86.9799	.01062	74.62	247.94	.00054	1.25100	2.1602
15.	76.0247	604.6	.24263	78.4985	.01156	83.06	218.31	.00056	1.24809	1.8373
* 15.832	75.2560	623.4	.23300	76.4147	.01167	88.03	197.78	.00058	1.24539	1.6349
* 15.832	.3165	157.7	.06680	.0193	.06860	13.56	8.58	.01426	1.00095	.6841
16.	.3129	159.4	.06682	.0193	.06771	13.63	8.67	.01452	1.00094	.6870
17.	.2931	170.1	.06687	.0194	.06293	14.04	9.24	.01611	1.00088	.7043
18.	.2758	180.8	.06689	.0195	.05887	14.52	9.80	.01781	1.00083	.7178
19.	.2605	191.4	.06689	.0196	.05535	15.02	10.35	.01958	1.00079	.7304
20.	.2469	202.0	.06689	.0196	.05227	15.63	10.90	.02158	1.00074	.7363
21.	.2346	212.6	.06688	.0197	.04953	16.41	11.44	.02391	1.00071	.7339
22.	.2236	223.2	.06686	.0197	.04708	17.20	11.98	.02636	1.00067	.7315
23.	.2135	233.7	.06685	.0197	.04487	17.99	12.50	.02892	1.00064	.7290
24.	.2044	244.2	.06684	.0198	.04287	18.78	13.03	.03159	1.00062	.7264
25.	.1960	254.7	.06683	.0198	.04105	19.57	13.55	.03438	1.00059	.7238
26.	.1883	265.2	.06682	.0198	.03938	20.35	14.06	.03726	1.00057	.7214
27.	.1811	275.7	.06681	.0198	.03784	21.13	14.56	.04026	1.00055	.7189
28.	.1745	286.2	.06680	.0198	.03642	21.91	15.06	.04337	1.00053	.7164
29.	.1684	296.6	.06679	.0199	.03511	22.70	15.56	.04659	1.00051	.7138
30.	.1627	307.0	.06679	.0199	.03389	23.48	16.05	.04992	1.00049	.7112
31.	.1574	317.5	.06678	.0199	.03276	24.18	16.53	.05318	1.00047	.7111
32.	.1524	327.9	.06677	.0199	.03170	24.87	17.01	.05654	1.00046	.7108
33.	.1477	338.3	.06676	.0199	.03071	25.57	17.48	.05999	1.00045	.7104
34.	.1433	348.7	.06675	.0199	.02978	26.27	17.95	.06356	1.00043	.7096
36.	.1352	369.6	.06673	.0199	.02808	27.68	18.88	.07101	1.00041	.7076
38.	.1281	390.4	.06670	.0199	.02656	29.09	19.78	.07884	1.00039	.7053
40.	.1216	411.4	.06665	.0199	.02521	30.50	20.67	.08706	1.00037	.7028
42.	.1158	432.4	.06657	.0199	.02398	31.89	21.54	.09563	1.00035	.7004
44.	.1105	453.6	.06647	.0200	.02288	33.29	22.40	.10456	1.00033	.6980
46.	.1056	474.9	.06632	.0200	.02187	34.69	23.24	.11384	1.00032	.6956
48.	.1012	496.6	.06613	.0200	.02094	36.09	24.06	.12343	1.00030	.6934
50.	.0971	518.6	.06588	.0200	.02010	37.49	24.87	.13332	1.00029	.6915
52.	.0934	540.9	.06557	.0200	.01931	38.88	25.67	.14347	1.00028	.6898
56.	.0867	587.2	.06474	.0200	.01792	41.68	27.24	.16448	1.00026	.6877
60.	.0809	636.1	.06360	.0200	.01672	44.54	28.75	.18641	1.00024	.6865
65.	.0747	701.8	.06176	.0200	.01542	48.42	30.59	.21571	1.00022	.6839
70.	.0693	773.5	.05953	.0200	.01431	52.29	32.37	.24530	1.00021	.6855
75.	.0647	851.8	.05701	.0200	.01336	56.16	34.10	.27477	1.00019	.6908
80.	.0606	937.0	.05435	.0200	.01252	60.07	35.78	.30409	1.00018	.6986
90.	.0539	1127.2	.04910	.0200	.01112	69.98	39.02	.37291	1.00016	.6990
100.	.0485	1339.3	.04451	.0200	.01001	79.90	42.10	.44256	1.00015	.7063
110.	.0441	1564.5	.04085	.0200	.00910	92.13	44.74	.52871	1.00013	.6911
120.	.0404	1793.8	.03812	.0200	.00834	102.78	47.58	.61231	1.00012	.6923
130.	.0373	2018.1	.03619	.0200	.00769	112.83	50.33	.70130	1.00011	.6926
140.	.0346	2231.8	.03491	.0200	.00714	121.78	53.00	.79390	1.00010	.6939
160.	.0303	2613.6	.03379	.0200	.00625	136.35	58.14	.99157	1.00009	.6966
180.	.0269	2935.9	.03386	.0200	.00556	147.53	63.06	1.20880	1.00008	.6972
200.	.0242	3214.0	.03454	.0200	.00500	156.62	67.80	1.44732	1.00007	.6956
220.	.0220	3466.5	.03547	.0200	.00455	164.60	72.38	1.70646	1.00007	.6928
240.	.0202	3709.0	.03642	.0200	.00417	172.06	76.82	1.98410	1.00006	.6900
260.	.0186	3951.7	.03726	.0200	.00385	179.32	81.15	2.27789	1.00006	.6877
280.	.0173	4199.3	.03794	.0200	.00357	186.57	85.35	2.58658	1.00005	.6861
300.	.0162	4453.6	.03848	.0200	.00333	193.89	89.48	2.90916	1.00005	.6851
350.	.0139	5121.7	.03925	.0200	.00286	212.50	99.40	3.77372	1.00004	.6844
400.	.0121	5820.1	.03957	.0200	.00250	231.39	108.86	4.72303	1.00004	.6845
450.	.0108	6538.6	.03964	.0200	.00222	250.24	117.95	5.75396	1.00003	.6848
500.	.0097	7262.6	.03966	.0200	.00200	268.83	126.70	6.87059	1.00003	.6845
550.	.0088	7993.6	.03963	.0200	.00182	287.08	135.18	8.06601	1.00003	.6843
600.	.0081	8730.0	.03956	.0200	.00167	305.01	143.40	9.33846	1.00002	.6840
700.	.0069	10224.1	.03935	.0200	.00143	340.16	159.23	12.10343	1.00002	.6837
800.	.0061	11757.8	.03901	.0200	.00125	374.85	174.35	15.14820	1.00002	.6836
900.	.0054	13341.7	.03855	.0200	.00111	409.59	188.89	18.46165	1.00002	.6836
1000.	.0048	14983.4	.03798	.0200	.00100	444.69	202.95	22.03375	1.00001	.6838
1200.	.0040	18442.1	.03668	.0200	.00083	511.17	229.87	29.63186	1.00001	.6911
1400.	.0035	22147.0	.03527	.0200	.00071	584.23	255.49	38.38501	1.00001	.6918
1600.	.0030	26174.7	.03373	.0200	.00063	664.26	280.05	48.23109	1.00001	.6897
1800.	.0027	31207.2	.03133	.0200	.00056	778.71	303.69	60.01969	1.00001	.6764
2000.	.0024	39423.8	.02681	.0200	.00050	1010.58	326.58	76.12031	1.00001	.6382
2200.	.0022	55459.1	.02019	.0199	.00046	1534.76	345.56	99.43507	1.00001	.5712
2400.	.0020	87042.3	.01358	.0196	.00042	2639.97	368.40	129.69252	1.00001	.5151
2600.	.0018	143972.7	.00877	.0192	.00040	4688.87	392.72	163.43974	1.00001	.4838
2800.	.0016	233719.2	.00586	.0183	.00039	7954.32	419.23	198.08286	1.00000	.4802
3000.	.0014	351285.0	.00429	.0170	.00039	12245.90	446.53	232.91357	1.00000	.5016

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.04 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.814	.01298	1.1647	.9237	-308.9	-308.4	4.967	4.68	6.38	1261.
	14.	.01301	1.1349	.9236	-307.7	-307.2	5.055	4.72	6.50	1250.
	15.	.01315	1.0346	.9083	-301.0	-300.5	5.517	4.92	6.99	1212.
	16.	.01331	.9689	.8905	-293.8	-293.2	5.984	5.12	7.44	1187.
	17.	.01348	.9053	.8754	-286.1	-285.5	6.450	5.30	7.92	1163.
*	17.497	.01357	.8806	.8682	-282.1	-281.5	6.683	5.39	8.15	1154.
*	17.497	1.71035	.0646	.0025	102.9	171.3	32.566	6.34	11.20	338.
	18.	1.76648	.0670	.0024	106.3	176.9	32.882	6.32	11.10	343.
	19.	1.87705	.0718	.0022	112.9	188.0	33.478	6.28	10.96	354.
	20.	1.98652	.0764	.0021	119.4	198.9	34.038	6.25	10.86	364.
	21.	2.09514	.0810	.0020	125.9	209.7	34.566	6.25	10.79	374.
	22.	2.20310	.0855	.0019	132.3	220.4	35.066	6.24	10.73	384.
	23.	2.31052	.0900	.0018	138.7	231.2	35.542	6.23	10.68	393.
	24.	2.41749	.0944	.0017	145.1	241.8	35.996	6.22	10.64	402.
	25.	2.52409	.0988	.0017	151.5	252.4	36.430	6.22	10.61	411.
	26.	2.63035	.1032	.0016	157.8	263.0	36.845	6.22	10.58	419.
	27.	2.73634	.1076	.0015	164.2	273.6	37.244	6.21	10.56	427.
	28.	2.84208	.1119	.0015	170.5	284.2	37.628	6.21	10.54	436.
	29.	2.94761	.1162	.0014	176.8	294.7	37.998	6.21	10.52	444.
	30.	3.05295	.1205	.0014	183.1	305.2	38.354	6.21	10.51	452.
	31.	3.15812	.1248	.0013	189.4	315.7	38.698	6.21	10.49	459.
	32.	3.26314	.1291	.0013	195.7	326.2	39.031	6.21	10.48	467.
	33.	3.36802	.1333	.0012	201.9	336.7	39.353	6.21	10.47	474.
	34.	3.47278	.1376	.0012	208.2	347.1	39.666	6.20	10.46	482.
	36.	3.68199	.1461	.0011	220.7	368.0	40.263	6.20	10.44	496.
	38.	3.89084	.1545	.0011	233.3	388.9	40.827	6.20	10.43	510.
	40.	4.09939	.1630	.0010	245.8	409.7	41.362	6.21	10.42	523.
	42.	4.30768	.1714	.0010	258.3	430.6	41.870	6.21	10.42	536.
	44.	4.51576	.1798	.0009	270.8	451.4	42.355	6.22	10.42	549.
	46.	4.72366	.1882	.0009	283.3	472.2	42.818	6.23	10.42	561.
	48.	4.93140	.1965	.0008	295.8	493.1	43.262	6.25	10.43	573.
	50.	5.13901	.2049	.0008	308.4	514.0	43.688	6.27	10.45	584.
	52.	5.34649	.2132	.0008	321.0	534.9	44.098	6.30	10.47	595.
	56.	5.76116	.2299	.0007	346.5	576.9	44.877	6.38	10.55	616.
	60.	6.17550	.2466	.0007	372.3	619.3	45.608	6.49	10.65	636.
	65.	6.69306	.2674	.0006	405.3	673.0	46.468	6.69	10.84	658.
	70.	7.21030	.2881	.0006	439.4	727.8	47.280	6.94	11.09	679.
	75.	7.72730	.3088	.0005	474.9	784.0	48.054	7.24	11.39	697.
	80.	8.24410	.3296	.0005	512.0	841.8	48.800	7.60	11.74	714.
	90.	9.27725	.3710	.0004	592.0	963.1	50.229	8.41	12.54	744.
	100.	10.30996	.4123	.0004	680.5	1092.9	51.595	9.27	13.41	772.
	110.	11.34235	.4537	.0004	777.4	1231.1	52.909	10.10	14.24	800.
	120.	12.37451	.4950	.0003	882.2	1377.2	54.180	10.83	14.96	827.
	130.	13.40649	.5363	.0003	993.5	1529.8	55.401	11.40	15.53	855.
	140.	14.43833	.5776	.0003	1109.8	1687.3	56.568	11.82	15.95	883.
	160.	16.50171	.6602	.0003	1351.0	2011.1	58.730	12.21	16.34	940.
	180.	18.56481	.7428	.0002	1595.5	2338.1	60.656	12.19	16.31	997.
	200.	20.62771	.8253	.0002	1837.1	2662.2	62.362	11.94	16.07	1054.
	220.	22.69048	.9079	.0002	2072.9	2980.5	63.880	11.63	15.76	1109.
	240.	24.75314	.9904	.0002	2302.4	3292.5	65.237	11.33	15.45	1162.
	260.	26.81572	1.0729	.0002	2526.3	3599.0	66.464	11.07	15.20	1213.
	280.	28.87824	1.1554	.0001	2745.7	3900.8	67.583	10.87	15.00	1262.
	300.	30.93842	1.2378	.0001	2961.6	4199.1	68.612	10.72	14.84	1309.
	350.	36.09405	1.4441	.0001	3491.5	4935.3	70.881	10.51	14.63	1418.
	400.	41.24955	1.6503	.0001	4014.5	5664.5	72.830	10.42	14.55	1518.
	450.	46.40496	1.8565	.0001	4534.8	6391.0	74.542	10.40	14.53	1610.
	500.	51.56032	2.0627	.0001	5055.1	7117.5	76.072	10.40	14.52	1695.
	550.	56.71565	2.2690	.0001	5575.1	7843.7	77.456	10.41	14.53	1780.
	600.	61.87095	2.4752	.0001	6096.0	8570.9	78.720	10.42	14.55	1859.
	700.	72.18149	2.8876	.0001	7140.9	10028.2	80.968	10.48	14.61	2006.
	800.	82.49200	3.3000	.0001	8193.4	11493.1	82.922	10.57	14.70	2142.
	900.	92.80248	3.7124	.0000	9256.7	12968.8	84.659	10.70	14.82	2268.
	1000.	103.11294	4.1249	.0000	10333.9	14458.5	86.231	10.86	14.98	2386.
	1200.	123.73385	4.9497	.0000	12544.2	17493.5	88.985	11.24	15.37	2601.
	1400.	144.35526	5.7745	.0000	14837.5	20611.7	91.392	11.69	15.81	2795.
	1600.	164.98269	6.5994	.0000	17223.9	23823.3	93.513	12.19	16.32	2972.
	1800.	185.64924	7.4242	.0000	19737.9	27163.9	95.442	12.96	17.12	3132.
	2000.	206.48386	8.2490	.0000	22498.0	30757.4	97.400	14.65	18.92	3264.
	2200.	227.85367	9.0739	.0000	25794.5	34938.6	100.047	18.39	22.99	3368.
	2400.	250.58802	9.8987	.0000	30232.6	40256.2	103.415	25.83	31.25	3460.
	2600.	276.25686	10.7235	.0000	36821.5	47871.8	107.759	38.89	46.11	3564.
	2800.	307.44190	11.5484	.0000	47030.5	59328.2	113.389	59.18	70.07	3694.
	3000.	347.85821	12.3732	.0000	62713.5	76627.9	120.644	86.94	104.52	3853.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.04 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	13.814	77.0340	619.8	.25646	89.7200	.01029	72.76	255.02	.00053	1.25164	2.2364
	14.	76.8696	613.6	.25483	87.2391	.01059	74.63	248.30	.00054	1.25106	2.1611
	15.	76.0433	605.3	.24280	78.6773	.01154	83.08	218.62	.00056	1.24816	1.8387
	16.	75.1384	608.0	.23158	72.8003	.01223	88.91	194.63	.00057	1.24498	1.6280
	17.	74.1849	607.4	.22254	67.1585	.01304	92.73	175.22	.00057	1.24164	1.4961
*	17.497	73.6915	608.9	.21861	64.8893	.01338	94.22	166.89	.00056	1.23991	1.4431
*	17.497	.5847	170.9	.06672	.0378	.06552	14.61	9.58	.00803	1.00176	.7338
	18.	.5661	176.3	.06682	.0379	.06297	14.83	9.85	.00849	1.00171	.7381
	19.	.5328	187.1	.06694	.0382	.05858	15.27	10.41	.00941	1.00161	.7470
	20.	.5034	197.9	.06700	.0385	.05487	15.86	10.95	.01044	1.00152	.7503
	21.	.4773	208.7	.06702	.0387	.05167	16.62	11.49	.01152	1.00144	.7460
	22.	.4539	219.5	.06702	.0388	.04887	17.39	12.03	.01285	1.00137	.7420
	23.	.4328	230.3	.06701	.0389	.04639	18.16	12.55	.01414	1.00130	.7383
	24.	.4137	241.0	.06700	.0391	.04416	18.94	13.07	.01549	1.00125	.7348
	25.	.3962	251.7	.06698	.0392	.04216	19.72	13.59	.01689	1.00119	.7313
	26.	.3802	262.4	.06697	.0392	.04034	20.49	14.10	.01834	1.00115	.7282
	27.	.3655	273.0	.06695	.0393	.03869	21.27	14.61	.01984	1.00110	.7252
	28.	.3519	283.6	.06694	.0394	.03717	22.04	15.10	.02140	1.00106	.7222
	29.	.3393	294.2	.06692	.0394	.03577	22.82	15.60	.02301	1.00102	.7192
	30.	.3276	304.7	.06691	.0395	.03447	23.59	16.09	.02468	1.00099	.7163
	31.	.3166	315.3	.06690	.0395	.03328	24.29	16.57	.02632	1.00095	.7157
	32.	.3065	325.8	.06688	.0396	.03216	24.98	17.05	.02801	1.00092	.7150
	33.	.2969	336.3	.06687	.0396	.03112	25.68	17.52	.02974	1.00089	.7142
	34.	.2880	346.8	.06686	.0396	.03015	26.38	17.99	.03154	1.00087	.7131
	36.	.2716	367.8	.06683	.0397	.02838	27.78	18.91	.03527	1.00082	.7106
	38.	.2570	388.9	.06679	.0397	.02682	29.19	19.81	.03920	1.00077	.7079
	40.	.2439	409.9	.06674	.0398	.02542	30.59	20.70	.04332	1.00074	.7051
	42.	.2321	431.1	.06666	.0398	.02416	31.98	21.57	.04762	1.00070	.7024
	44.	.2214	452.3	.06655	.0398	.02303	33.38	22.42	.05209	1.00067	.6998
	46.	.2117	473.8	.06640	.0398	.02200	34.77	23.26	.05674	1.00064	.6972
	48.	.2028	495.5	.06620	.0399	.02106	36.17	24.09	.06155	1.00061	.6948
	50.	.1946	517.5	.06595	.0399	.02019	37.56	24.90	.06650	1.00059	.6927
	52.	.1870	540.0	.06564	.0399	.01940	38.96	25.70	.07159	1.00056	.6909
	56.	.1736	586.4	.06480	.0399	.01799	41.75	27.26	.08211	1.00052	.6886
	60.	.1619	635.4	.06366	.0399	.01677	44.61	28.78	.09309	1.00049	.6872
	65.	.1494	701.2	.06182	.0399	.01546	48.48	30.61	.10776	1.00045	.6845
	70.	.1387	772.9	.05957	.0400	.01434	52.35	32.39	.12257	1.00042	.6860
	75.	.1294	851.2	.05705	.0400	.01338	56.21	34.12	.13732	1.00039	.6912
	80.	.1213	936.5	.05439	.0400	.01253	60.12	35.80	.15200	1.00037	.6990
	90.	.1078	1126.8	.04913	.0400	.01113	70.03	39.03	.18643	1.00032	.6992
	100.	.0970	1338.9	.04453	.0400	.01001	79.94	42.12	.22128	1.00029	.7064
	110.	.0882	1564.2	.04087	.0400	.00910	92.15	44.74	.26431	1.00027	.6912
	120.	.0808	1793.6	.03813	.0400	.00834	102.79	47.58	.30613	1.00024	.6924
	130.	.0746	2018.0	.03621	.0400	.00770	112.84	50.33	.35064	1.00022	.6927
	140.	.0693	2231.8	.03493	.0400	.00715	121.79	53.00	.39695	1.00021	.6940
	160.	.0606	2613.6	.03380	.0400	.00625	136.36	58.14	.49582	1.00018	.6966
	180.	.0539	2936.1	.03387	.0400	.00556	147.53	63.06	.60445	1.00016	.6973
	200.	.0485	3214.3	.03455	.0400	.00500	156.63	67.80	.72373	1.00015	.6957
	220.	.0441	3466.8	.03548	.0400	.00455	164.61	72.38	.85332	1.00013	.6929
	240.	.0404	3709.3	.03642	.0400	.00417	172.06	76.82	.99216	1.00012	.6900
	260.	.0373	3952.1	.03726	.0400	.00385	179.33	81.15	1.13907	1.00011	.6877
	280.	.0346	4199.7	.03795	.0400	.00357	186.58	85.36	1.29343	1.00010	.6861
	300.	.0323	4454.0	.03849	.0400	.00333	193.89	89.48	1.45474	1.00010	.6851
	350.	.0277	5122.2	.03926	.0400	.00286	212.51	99.40	1.88705	1.00008	.6844
	400.	.0242	5820.6	.03957	.0400	.00250	231.40	108.86	2.36174	1.00007	.6845
	450.	.0215	6539.2	.03964	.0400	.00222	250.24	117.95	2.87724	1.00006	.6848
	500.	.0194	7263.1	.03966	.0400	.00200	268.83	126.70	3.43558	1.00006	.6845
	550.	.0176	7994.2	.03963	.0400	.00182	287.09	135.18	4.03331	1.00005	.6843
	600.	.0162	8730.5	.03957	.0400	.00167	305.02	143.40	4.66957	1.00005	.6840
	700.	.0139	10224.7	.03935	.0400	.00143	340.16	159.23	6.05210	1.00004	.6837
	800.	.0121	11758.4	.03901	.0400	.00125	374.85	174.35	7.57453	1.00004	.6836
	900.	.0108	13342.3	.03855	.0400	.00111	409.59	188.89	9.23129	1.00003	.6836
	1000.	.0097	14984.0	.03798	.0400	.00100	444.69	202.95	11.01738	1.00003	.6838
	1200.	.0081	18442.4	.03668	.0400	.00083	511.16	229.87	14.81632	1.00002	.6911
	1400.	.0069	22140.9	.03528	.0400	.00071	583.96	255.49	19.19935	1.00002	.6919
	1600.	.0061	26108.0	.03384	.0400	.00062	661.59	280.05	24.08132	1.00002	.6907
	1800.	.0054	30811.3	.03183	.0400	.00056	763.23	303.68	29.79266	1.00002	.6812
	2000.	.0048	37799.5	.02819	.0400	.00050	947.86	326.53	37.23361	1.00001	.6519
	2200.	.0044	50363.4	.02253	.0398	.00046	1339.80	345.36	47.79499	1.00001	.5927
	2400.	.0040	74073.9	.01617	.0395	.00042	2147.32	367.77	61.98178	1.00001	.5353
	2600.	.0036	116351.6	.01093	.0388	.00040	3645.65	391.22	78.62433	1.00001	.4949
	2800.	.0033	184231.8	.00742	.0376	.00038	6093.91	416.61	96.26162	1.00001	.4790
	3000.	.0029	279107.0	.00533	.0356	.00037	9541.08	443.87	114.20189	1.00001	.4867

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.06 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.821	.01298	1.1660	.9239	-308.9	-308.1	4.967	4.68	6.38	1261.
	14.	.01301	1.1380	.9239	-307.7	-306.9	5.052	4.71	6.49	1252.
	15.	.01315	1.0367	.9090	-301.0	-300.2	5.514	4.92	6.99	1213.
	16.	.01331	.9709	.8912	-293.8	-293.0	5.980	5.12	7.43	1188.
	17.	.01348	.9073	.8761	-286.1	-285.3	6.447	5.30	7.91	1164.
	18.	.01366	.8460	.8616	-278.0	-277.2	6.914	5.47	8.42	1141.
*	18.621	.01378	.8147	.8524	-272.6	-271.8	7.205	5.56	8.72	1130.
*	18.621	1.19270	.0663	.0036	107.6	179.2	31.430	6.41	11.53	345.
	19.	1.22174	.0682	.0035	110.2	183.6	31.662	6.38	11.43	350.
	20.	1.29743	.0732	.0033	117.0	194.9	32.243	6.33	11.23	360.
	21.	1.37208	.0780	.0031	123.7	206.0	32.787	6.29	11.09	371.
	22.	1.44595	.0828	.0029	130.3	217.1	33.300	6.27	10.98	381.
	23.	1.51921	.0875	.0028	136.9	228.0	33.787	6.26	10.90	390.
	24.	1.59196	.0921	.0026	143.4	238.9	34.249	6.25	10.83	400.
	25.	1.66430	.0966	.0025	149.8	249.7	34.690	6.24	10.78	409.
	26.	1.73629	.1011	.0024	156.3	260.4	35.112	6.23	10.73	417.
	27.	1.80798	.1056	.0023	162.7	271.2	35.516	6.23	10.70	426.
	28.	1.87941	.1101	.0022	169.1	281.8	35.905	6.23	10.66	434.
	29.	1.95062	.1145	.0021	175.4	292.5	36.278	6.22	10.63	442.
	30.	2.02162	.1189	.0021	181.8	303.1	36.639	6.22	10.61	450.
	31.	2.09245	.1232	.0020	188.2	313.7	36.986	6.22	10.59	458.
	32.	2.16313	.1276	.0019	194.5	324.3	37.322	6.22	10.57	466.
	33.	2.23367	.1319	.0019	200.8	334.8	37.647	6.21	10.55	473.
	34.	2.30408	.1363	.0018	207.1	345.4	37.961	6.21	10.53	481.
	36.	2.44457	.1449	.0017	219.7	366.4	38.563	6.21	10.51	495.
	38.	2.58470	.1534	.0016	232.3	387.4	39.130	6.21	10.49	509.
	40.	2.72452	.1620	.0015	244.9	408.4	39.668	6.21	10.47	522.
	42.	2.86409	.1705	.0014	257.4	429.3	40.178	6.22	10.46	536.
	44.	3.00344	.1789	.0014	270.0	450.2	40.665	6.23	10.46	548.
	46.	3.14260	.1874	.0013	282.6	471.1	41.129	6.24	10.46	561.
	48.	3.28161	.1958	.0013	295.1	492.0	41.575	6.25	10.47	572.
	50.	3.42047	.2042	.0012	307.8	513.0	42.002	6.28	10.48	584.
	52.	3.55922	.2126	.0012	320.4	534.0	42.414	6.30	10.50	595.
	56.	3.83641	.2294	.0011	345.9	576.1	43.194	6.38	10.57	616.
	60.	4.11327	.2461	.0010	371.8	618.6	43.927	6.50	10.67	636.
	65.	4.45897	.2670	.0009	404.8	672.4	44.788	6.69	10.86	658.
	70.	4.80437	.2878	.0009	439.0	727.3	45.601	6.94	11.10	679.
	75.	5.14951	.3086	.0008	474.5	783.5	46.377	7.24	11.40	697.
	80.	5.49446	.3294	.0008	511.7	841.3	47.124	7.60	11.75	714.
	90.	6.18390	.3709	.0007	591.7	962.8	48.553	8.41	12.55	744.
	100.	6.87291	.4123	.0006	680.2	1092.6	49.920	9.27	13.41	772.
	110.	7.56159	.4537	.0005	777.2	1230.9	51.235	10.10	14.24	800.
	120.	8.25003	.4951	.0005	882.0	1377.0	52.506	10.83	14.96	827.
	130.	8.93831	.5364	.0005	993.3	1529.6	53.728	11.40	15.54	855.
	140.	9.62644	.5777	.0004	1109.6	1687.2	54.895	11.82	15.95	883.
	160.	11.00241	.6604	.0004	1350.8	2011.0	57.056	12.21	16.34	940.
	180.	12.37810	.7430	.0003	1595.4	2338.1	58.983	12.19	16.31	997.
	200.	13.75359	.8255	.0003	1837.0	2662.2	60.690	11.94	16.07	1054.
	220.	15.12893	.9081	.0003	2072.8	2980.5	62.207	11.63	15.76	1109.
	240.	16.50418	.9906	.0003	2302.3	3292.6	63.565	11.33	15.45	1163.
	260.	17.87935	1.0732	.0002	2526.3	3599.0	64.791	11.07	15.20	1214.
	280.	19.25446	1.1557	.0002	2745.6	3900.9	65.910	10.87	15.00	1263.
	300.	20.62801	1.2381	.0002	2961.5	4199.2	66.940	10.72	14.85	1309.
	350.	24.06523	1.4444	.0002	3491.5	4935.4	69.208	10.51	14.63	1418.
	400.	27.50233	1.6506	.0002	4014.5	5664.6	71.157	10.42	14.55	1518.
	450.	30.93934	1.8568	.0001	4534.7	6391.1	72.870	10.40	14.53	1610.
	500.	34.37630	2.0631	.0001	5055.1	7117.7	74.399	10.40	14.52	1697.
	550.	37.81322	2.2693	.0001	5575.0	7843.8	75.784	10.41	14.53	1780.
	600.	41.25012	2.4755	.0001	6096.0	8571.0	77.048	10.42	14.55	1859.
	700.	48.12386	2.8879	.0001	7140.9	10028.4	79.295	10.48	14.61	2006.
	800.	54.99756	3.3004	.0001	8193.4	11493.3	81.250	10.57	14.70	2142.
	900.	61.87123	3.7128	.0001	9256.7	12969.0	82.987	10.70	14.82	2268.
	1000.	68.74489	4.1252	.0001	10333.9	14458.6	84.559	10.86	14.98	2386.
	1200.	82.49218	4.9501	.0001	12544.2	17493.7	87.312	11.24	15.37	2601.
	1400.	96.23973	5.7749	.0000	14837.3	20611.7	89.720	11.69	15.81	2795.
	1600.	109.99056	6.5997	.0000	17222.2	23821.7	91.840	12.17	16.30	2973.
	1800.	123.76268	7.4246	.0000	19726.6	27152.3	93.763	12.87	17.02	3134.
	2000.	137.62628	8.2494	.0000	22446.6	30704.2	95.699	14.31	18.56	3271.
	2200.	151.78122	9.0742	.0000	25616.5	34723.3	98.284	17.43	21.94	3380.
	2400.	166.67898	9.8991	.0000	29730.3	39731.0	101.505	23.57	28.74	3473.
	2600.	183.17473	10.7239	.0000	35611.7	46602.2	105.552	34.34	40.94	3574.
	2800.	202.67903	11.5487	.0000	44465.4	56626.1	110.654	51.16	60.63	3696.
	3000.	227.24916	12.3736	.0000	57839.5	71474.4	117.065	74.57	89.35	3845.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.06 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.821	77.0455	620.4	.25644	89.8314	.01028	72.84	255.14	.00053	1.25168	2.2350
14.	76.8869	614.7	.25486	87.4981	.01056	74.65	248.65	.00054	1.25112	2.1620
15.	76.0618	606.0	.24296	78.8559	.01153	83.11	218.92	.00056	1.24822	1.8401
16.	75.1582	608.7	.23173	72.9692	.01221	88.95	194.90	.00057	1.24505	1.6289
17.	74.2067	608.1	.22269	67.3243	.01301	92.77	175.47	.00057	1.24172	1.4968
18.	73.2096	605.0	.21517	61.9320	.01391	95.46	159.47	.00056	1.23823	1.4062
* 18.621	72.5645	604.7	.21108	59.1157	.01442	96.52	150.87	.00055	1.23598	1.3628
* 18.621	.8384	178.9	.06666	.0556	.06446	15.43	10.26	.00574	1.00253	.7667
19.	.8185	183.1	.06678	.0558	.06246	15.58	10.47	.00599	1.00247	.7681
20.	.7708	194.0	.06699	.0564	.05790	16.11	11.01	.00670	1.00232	.7673
21.	.7288	205.0	.06709	.0569	.05410	16.84	11.55	.00750	1.00220	.7600
22.	.6916	215.9	.06714	.0573	.05086	17.59	12.08	.00834	1.00209	.7539
23.	.6582	226.9	.06715	.0576	.04804	18.35	12.60	.00921	1.00198	.7486
24.	.6282	237.8	.06714	.0578	.04556	19.11	13.12	.01011	1.00189	.7438
25.	.6009	248.6	.06713	.0581	.04335	19.88	13.64	.01105	1.00181	.7394
26.	.5759	259.5	.06711	.0582	.04137	20.65	14.15	.01202	1.00174	.7355
27.	.5531	270.3	.06709	.0584	.03958	21.41	14.65	.01303	1.00167	.7318
28.	.5321	281.0	.06707	.0586	.03794	22.18	15.15	.01407	1.00160	.7283
29.	.5127	291.7	.06705	.0587	.03645	22.94	15.64	.01515	1.00155	.7249
30.	.4947	302.4	.06703	.0588	.03508	23.71	16.13	.01627	1.00149	.7215
31.	.4779	313.1	.06701	.0589	.03381	24.40	16.61	.01737	1.00144	.7204
32.	.4623	323.7	.06700	.0590	.03264	25.10	17.08	.01850	1.00139	.7193
33.	.4477	334.3	.06698	.0591	.03155	25.79	17.56	.01966	1.00135	.7181
34.	.4340	344.9	.06697	.0591	.03053	26.49	18.02	.02086	1.00131	.7167
36.	.4091	366.1	.06693	.0593	.02870	27.89	18.94	.02336	1.00123	.7137
38.	.3869	387.3	.06689	.0594	.02707	29.28	19.85	.02599	1.00117	.7106
40.	.3670	408.5	.06683	.0594	.02563	30.68	20.73	.02874	1.00111	.7074
42.	.3492	429.7	.06674	.0595	.02434	32.07	21.60	.03161	1.00105	.7044
44.	.3330	451.1	.06663	.0596	.02318	33.47	22.45	.03460	1.00100	.7015
46.	.3182	472.6	.06648	.0596	.02213	34.86	23.29	.03771	1.00096	.6988
48.	.3047	494.4	.06628	.0597	.02117	36.25	24.12	.04092	1.00092	.6962
50.	.2924	516.5	.06602	.0597	.02029	37.64	24.93	.04423	1.00088	.6940
52.	.2810	539.0	.06571	.0597	.01948	39.03	25.72	.04762	1.00085	.6921
56.	.2607	585.6	.06486	.0598	.01805	41.82	27.28	.05465	1.00079	.6895
60.	.2431	634.6	.06372	.0598	.01682	44.68	28.80	.06198	1.00073	.6880
65.	.2243	700.5	.06187	.0599	.01550	48.54	30.63	.07177	1.00068	.6851
70.	.2081	772.3	.05962	.0599	.01437	52.41	32.41	.08166	1.00063	.6865
75.	.1942	850.7	.05709	.0599	.01340	56.26	34.14	.09150	1.00059	.6916
80.	.1820	936.0	.05443	.0599	.01255	60.17	35.82	.10130	1.00055	.6994
90.	.1617	1126.3	.04916	.0600	.01114	70.07	39.05	.12428	1.00049	.6995
100.	.1455	1338.5	.04456	.0600	.01002	79.98	42.13	.14753	1.00044	.7066
110.	.1322	1563.9	.04089	.0600	.00911	92.16	44.75	.17617	1.00040	.6914
120.	.1212	1793.3	.03815	.0600	.00834	102.81	47.58	.20407	1.00037	.6925
130.	.1119	2017.8	.03622	.0600	.00770	112.85	50.33	.23375	1.00034	.6928
140.	.1039	2231.7	.03494	.0600	.00715	121.80	53.00	.26464	1.00031	.6941
160.	.0909	2613.7	.03381	.0600	.00625	136.38	58.14	.33056	1.00027	.6967
180.	.0808	2936.2	.03388	.0600	.00556	147.54	63.06	.40300	1.00024	.6973
200.	.0727	3214.5	.03456	.0600	.00500	156.64	67.80	.48253	1.00022	.6957
220.	.0661	3467.1	.03548	.0600	.00455	164.61	72.38	.56894	1.00020	.6929
240.	.0606	3709.7	.03643	.0600	.00417	172.07	76.82	.66151	1.00018	.6900
260.	.0559	3952.5	.03727	.0600	.00385	179.34	81.15	.75946	1.00017	.6877
280.	.0519	4200.1	.03796	.0600	.00357	186.59	85.36	.85238	1.00016	.6861
300.	.0485	4454.5	.03849	.0600	.00333	193.90	89.48	.95993	1.00015	.6851
350.	.0416	5122.7	.03926	.0600	.00286	212.51	99.40	1.25816	1.00013	.6845
400.	.0364	5821.2	.03957	.0600	.00250	231.40	108.86	1.57464	1.00011	.6845
450.	.0323	6539.7	.03965	.0600	.00222	250.24	117.95	1.91833	1.00010	.6848
500.	.0291	7263.7	.03967	.0600	.00200	268.83	126.70	2.29057	1.00009	.6845
550.	.0264	7994.7	.03963	.0600	.00182	287.09	135.18	2.68908	1.00008	.6843
600.	.0242	8731.1	.03957	.0600	.00167	305.02	143.40	3.11327	1.00007	.6840
700.	.0208	10225.3	.03936	.0600	.00143	340.16	159.23	4.03498	1.00006	.6837
800.	.0182	11759.0	.03902	.0600	.00125	374.85	174.35	5.04996	1.00005	.6836
900.	.0162	13343.0	.03855	.0600	.00111	409.59	188.89	6.15450	1.00005	.6836
1000.	.0145	14984.6	.03799	.0600	.00100	444.69	202.95	7.34525	1.00004	.6838
1200.	.0121	18442.9	.03669	.0600	.00083	511.15	229.87	9.87786	1.00004	.6911
1400.	.0104	22138.5	.03529	.0600	.00071	583.83	255.49	12.79276	1.00003	.6919
1600.	.0091	26078.9	.03389	.0600	.00062	660.41	280.05	16.04431	1.00003	.6911
1800.	.0081	30636.3	.03206	.0600	.00056	756.37	303.68	19.79668	1.00002	.6835
2000.	.0073	37079.7	.02885	.0599	.00050	920.05	326.51	24.56292	1.00002	.6586
2200.	.0066	48100.2	.02375	.0598	.00046	1253.19	345.27	31.20707	1.00002	.6045
2400.	.0060	68283.5	.01768	.0594	.00042	1927.32	367.49	40.23411	1.00002	.5481
2600.	.0055	103863.6	.01231	.0585	.00039	3173.88	390.51	51.12170	1.00002	.5037
2800.	.0049	161208.9	.00849	.0570	.00038	5228.09	415.22	62.92138	1.00001	.4815
3000.	.0044	243245.4	.00610	.0544	.00037	8196.95	441.99	75.05428	1.00001	.4818

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.08 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.828	.01298	1.1672	.9241	-308.9	-307.9	4.968	4.68	6.38	1262.
14.	.01300	1.1411	.9241	-307.8	-306.7	5.050	4.71	6.49	1253.
15.	.01314	1.0388	.9097	-301.1	-300.0	5.511	4.92	6.98	1214.
16.	.01330	.9729	.8919	-293.9	-292.8	5.977	5.12	7.43	1189.
17.	.01347	.9092	.8768	-286.2	-285.1	6.444	5.30	7.91	1165.
18.	.01366	.8480	.8623	-278.0	-276.9	6.911	5.47	8.41	1142.
19.	.01385	.7833	.8470	-269.4	-268.3	7.379	5.62	8.96	1117.
* 19.496	.01396	.7643	.8384	-264.9	-263.8	7.614	5.69	9.18	1111.
* 19.496	.92223	.0671	.0047	110.9	184.7	30.623	6.46	11.84	351.
20.	.95189	.0698	.0045	114.5	190.7	30.923	6.41	11.58	356.
21.	1.00981	.0750	.0042	121.4	202.2	31.487	6.35	11.44	367.
22.	1.06682	.0800	.0040	128.2	213.6	32.015	6.32	11.27	378.
23.	1.12311	.0849	.0038	134.9	224.8	32.513	6.29	11.14	388.
24.	1.17885	.0897	.0036	141.5	235.9	32.985	6.27	11.04	397.
25.	1.23413	.0944	.0034	148.1	246.9	33.434	6.26	10.96	406.
26.	1.28903	.0990	.0033	154.7	257.8	33.863	6.25	10.89	415.
27.	1.34361	.1036	.0031	161.2	268.7	34.273	6.25	10.84	424.
28.	1.39792	.1082	.0030	167.6	279.5	34.666	6.24	10.79	433.
29.	1.45199	.1127	.0029	174.1	290.2	35.044	6.24	10.75	441.
30.	1.50585	.1172	.0028	180.5	301.0	35.408	6.23	10.72	449.
31.	1.55953	.1217	.0027	186.9	311.7	35.759	6.23	10.68	457.
32.	1.61305	.1261	.0026	193.3	322.3	36.098	6.23	10.66	465.
33.	1.66642	.1305	.0025	199.7	333.0	36.425	6.22	10.63	472.
34.	1.71967	.1349	.0024	206.0	343.6	36.742	6.22	10.61	480.
36.	1.82582	.1437	.0023	218.7	364.8	37.348	6.22	10.57	494.
38.	1.93160	.1523	.0022	231.4	385.9	37.919	6.22	10.54	508.
40.	2.03707	.1610	.0020	244.0	407.0	38.459	6.22	10.52	522.
42.	2.14228	.1695	.0019	256.6	428.0	38.972	6.22	10.51	535.
44.	2.24726	.1781	.0018	269.2	449.0	39.460	6.23	10.50	548.
46.	2.35206	.1866	.0018	281.8	470.0	39.927	6.24	10.49	560.
48.	2.45670	.1951	.0017	294.5	491.0	40.374	6.26	10.50	572.
50.	2.56120	.2036	.0016	307.1	512.0	40.803	6.28	10.51	584.
52.	2.66558	.2120	.0016	319.8	533.0	41.215	6.31	10.53	595.
56.	2.87403	.2289	.0014	345.4	575.3	41.998	6.39	10.59	616.
60.	3.08215	.2457	.0013	371.3	617.8	42.732	6.50	10.69	636.
65.	3.34194	.2666	.0012	404.4	671.7	43.594	6.69	10.87	658.
70.	3.60140	.2875	.0011	438.6	726.7	44.408	6.94	11.11	679.
75.	3.86062	.3084	.0011	474.1	783.0	45.185	7.24	11.41	697.
80.	4.11964	.3292	.0010	511.3	840.9	45.932	7.60	11.76	714.
90.	4.63723	.3708	.0009	591.4	962.4	47.363	8.41	12.56	744.
100.	5.15438	.4123	.0008	679.9	1092.3	48.730	9.27	13.42	772.
110.	5.67121	.4537	.0007	776.9	1230.6	50.046	10.10	14.25	800.
120.	6.18780	.4951	.0007	881.8	1376.8	51.318	10.83	14.97	827.
130.	6.70422	.5365	.0006	993.1	1529.4	52.539	11.40	15.54	855.
140.	7.22050	.5779	.0006	1109.4	1687.0	53.707	11.82	15.95	883.
160.	8.25276	.6605	.0005	1350.7	2010.9	55.869	12.21	16.34	940.
180.	9.28474	.7432	.0004	1595.3	2338.0	57.796	12.19	16.32	997.
200.	10.31652	.8257	.0004	1836.8	2662.2	59.502	11.95	16.07	1054.
220.	11.34817	.9083	.0004	2072.7	2980.5	61.020	11.63	15.76	1109.
240.	12.37971	.9909	.0003	2302.2	3292.6	62.378	11.33	15.46	1163.
260.	13.41117	1.0734	.0003	2526.2	3599.1	63.605	11.07	15.20	1214.
280.	14.44257	1.1560	.0003	2745.6	3901.0	64.724	10.87	15.00	1263.
300.	15.47280	1.2384	.0003	2961.5	4199.3	65.753	10.72	14.85	1310.
350.	18.05083	1.4447	.0002	3491.4	4935.5	68.022	10.51	14.63	1418.
400.	20.62872	1.6509	.0002	4014.5	5664.8	69.971	10.42	14.55	1518.
450.	23.20653	1.8572	.0002	4534.7	6391.2	71.683	10.41	14.53	1610.
500.	25.78429	2.0634	.0002	5055.1	7117.8	73.213	10.40	14.52	1698.
550.	28.36201	2.2696	.0001	5575.0	7844.0	74.597	10.41	14.53	1780.
600.	30.93970	2.4759	.0001	6096.0	8571.2	75.861	10.42	14.55	1859.
700.	36.09504	2.8883	.0001	7140.9	10028.5	78.109	10.48	14.61	2006.
800.	41.25034	3.3007	.0001	8193.4	11493.4	80.064	10.57	14.70	2142.
900.	46.40561	3.7131	.0001	9256.7	12969.2	81.800	10.70	14.82	2268.
1000.	51.56086	4.1256	.0001	10333.9	14458.8	83.372	10.86	14.98	2386.
1200.	61.87135	4.9504	.0001	12544.2	17493.9	86.126	11.24	15.37	2601.
1400.	72.18199	5.7753	.0001	14837.2	20611.8	88.533	11.69	15.81	2795.
1600.	82.49476	6.6001	.0001	17221.2	23820.8	90.652	12.16	16.29	2973.
1800.	92.82135	7.4249	.0000	19719.8	27145.5	92.572	12.81	16.96	3135.
2000.	103.20737	8.2498	.0000	22415.9	30672.5	94.495	14.11	18.34	3275.
2200.	113.78262	9.0746	.0000	25510.3	34613.0	97.043	16.85	21.32	3388.
2400.	124.84038	9.8994	.0000	29430.8	39418.0	100.176	22.22	27.25	3483.
2600.	136.93628	10.7243	.0000	34890.3	45845.2	104.047	31.61	37.85	3582.
2800.	150.98825	11.5491	.0000	42933.9	55012.9	108.832	46.32	54.97	3699.
3000.	168.34401	12.3739	.0000	54917.2	68384.7	114.736	66.97	80.08	3841.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.08 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.828	77.0570	621.0	.25641	89.9428	.01027	72.92	255.26	.00053	1.25172	2.2336
14.	76.9043	615.9	.25489	87.7567	.01053	74.67	249.01	.00054	1.25118	2.1630
15.	76.0803	606.6	.24313	79.0342	.01151	83.13	219.23	.00056	1.24829	1.8415
16.	75.1781	609.4	.23189	73.1378	.01219	88.98	195.17	.00057	1.24512	1.6299
17.	74.2283	608.8	.22283	67.4898	.01299	92.81	175.71	.00057	1.24179	1.4974
18.	73.2332	605.8	.21531	62.1031	.01388	95.51	159.70	.00056	1.23831	1.4065
19.	72.1879	598.0	.20884	56.5441	.01498	97.04	146.25	.00054	1.23466	1.3500
* 19.496	71.6402	599.5	.20583	54.7547	.01531	97.43	140.27	.00053	1.23276	1.3216
* 19.496	1.0843	184.6	.06665	.0727	.06416	16.11	10.80	.00452	1.00327	.7938
20.	1.0505	190.1	.06684	.0733	.06144	16.41	11.07	.00481	1.00317	.7879
21.	.9903	201.2	.06708	.0742	.05686	17.10	11.60	.00543	1.00299	.7764
22.	.9374	212.4	.06720	.0750	.05307	17.81	12.13	.00607	1.00283	.7675
23.	.8904	223.5	.06726	.0756	.04986	18.55	12.65	.00673	1.00269	.7601
24.	.8483	234.6	.06727	.0761	.04707	19.30	13.17	.00742	1.00256	.7538
25.	.8103	245.6	.06726	.0765	.04463	20.05	13.69	.00813	1.00244	.7481
26.	.7758	256.6	.06725	.0768	.04246	20.80	14.19	.00886	1.00234	.7433
27.	.7443	267.5	.06722	.0771	.04051	21.56	14.69	.00962	1.00224	.7388
28.	.7153	278.4	.06720	.0774	.03876	22.31	15.19	.01041	1.00216	.7347
29.	.6887	289.3	.06718	.0776	.03716	23.07	15.68	.01122	1.00208	.7307
30.	.6641	300.1	.06715	.0778	.03570	23.83	16.17	.01206	1.00200	.7270
31.	.6412	310.9	.06713	.0780	.03436	24.52	16.65	.01289	1.00193	.7253
32.	.6199	321.7	.06711	.0782	.03313	25.21	17.12	.01374	1.00187	.7237
33.	.6001	332.4	.06709	.0783	.03199	25.90	17.59	.01462	1.00181	.7222
34.	.5815	343.1	.06707	.0785	.03093	26.60	18.06	.01552	1.00175	.7204
36.	.5477	364.4	.06703	.0787	.02901	27.99	18.98	.01740	1.00165	.7169
38.	.5177	385.7	.06698	.0789	.02734	29.38	19.88	.01938	1.00156	.7133
40.	.4909	407.0	.06692	.0790	.02585	30.78	20.76	.02145	1.00148	.7098
42.	.4668	428.4	.06683	.0791	.02453	32.17	21.63	.02361	1.00141	.7065
44.	.4450	449.8	.06671	.0792	.02334	33.55	22.48	.02586	1.00134	.7033
46.	.4252	471.5	.06656	.0793	.02226	34.94	23.32	.02819	1.00128	.7004
48.	.4070	493.3	.06635	.0794	.02128	36.33	24.14	.03060	1.00123	.6977
50.	.3904	515.5	.06610	.0795	.02039	37.72	24.95	.03309	1.00118	.6952
52.	.3752	538.1	.06578	.0795	.01957	39.11	25.75	.03564	1.00113	.6932
56.	.3479	584.7	.06493	.0796	.01812	41.89	27.31	.04092	1.00105	.6904
60.	.3244	633.9	.06378	.0797	.01687	44.74	28.82	.04643	1.00098	.6887
65.	.2992	699.8	.06192	.0798	.01554	48.60	30.65	.05378	1.00090	.6857
70.	.2777	771.7	.05967	.0798	.01440	52.47	32.43	.06121	1.00084	.6869
75.	.2590	850.1	.05714	.0799	.01342	56.32	34.16	.06859	1.00078	.6921
80.	.2427	935.4	.05446	.0799	.01257	60.22	35.83	.07595	1.00073	.6997
90.	.2156	1125.9	.04920	.0800	.01116	70.12	39.06	.09320	1.00065	.6997
100.	.1940	1338.1	.04459	.0800	.01003	80.03	42.15	.11065	1.00058	.7068
110.	.1763	1563.6	.04091	.0800	.00911	92.18	44.75	.13211	1.00053	.6916
120.	.1616	1793.1	.03817	.0800	.00835	102.82	47.58	.15304	1.00049	.6926
130.	.1492	2017.6	.03624	.0800	.00770	112.87	50.33	.17531	1.00045	.6929
140.	.1385	2231.6	.03495	.0800	.00715	121.82	53.00	.19848	1.00042	.6941
160.	.1212	2613.7	.03382	.0800	.00625	136.39	58.14	.24793	1.00037	.6967
180.	.1077	2936.4	.03389	.0800	.00556	147.55	63.06	.30227	1.00032	.6974
200.	.0969	3214.7	.03456	.0800	.00500	156.64	67.80	.36193	1.00029	.6957
220.	.0881	3467.4	.03549	.0800	.00455	164.62	72.38	.42675	1.00027	.6929
240.	.0808	3710.0	.03644	.0800	.00417	172.07	76.83	.49618	1.00024	.6900
260.	.0746	3952.9	.03728	.0800	.00385	179.34	81.15	.55965	1.00022	.6878
280.	.0692	4200.6	.03796	.0800	.00357	186.59	85.36	.64685	1.00021	.6862
300.	.0646	4454.9	.03850	.0800	.00333	193.90	89.48	.72752	1.00019	.6851
350.	.0554	5123.2	.03927	.0800	.00286	212.51	99.40	.94372	1.00017	.6845
400.	.0485	5821.7	.03958	.0800	.00250	231.40	108.87	1.18109	1.00015	.6845
450.	.0431	6540.3	.03965	.0800	.00222	250.25	117.95	1.43887	1.00013	.6848
500.	.0388	7264.3	.03967	.0800	.00200	268.84	126.70	1.71807	1.00012	.6846
550.	.0353	7995.3	.03964	.0800	.00182	287.09	135.18	2.01696	1.00011	.6843
600.	.0323	8731.7	.03957	.0800	.00167	305.02	143.41	2.33511	1.00010	.6840
700.	.0277	10225.9	.03936	.0800	.00143	340.16	159.23	3.02642	1.00008	.6837
800.	.0242	11759.6	.03902	.0800	.00125	374.85	174.35	3.78768	1.00007	.6835
900.	.0215	13343.6	.03855	.0800	.00111	409.60	188.89	4.61610	1.00006	.6836
1000.	.0194	14985.3	.03799	.0800	.00100	444.69	202.95	5.50918	1.00006	.6838
1200.	.0162	18443.5	.03669	.0800	.00083	511.15	229.87	7.40863	1.00005	.6911
1400.	.0139	22137.4	.03530	.0800	.00071	583.76	255.49	9.59445	1.00004	.6920
1600.	.0121	26061.8	.03392	.0800	.00062	659.70	280.05	12.02892	1.00004	.6914
1800.	.0108	30532.2	.03219	.0800	.00056	752.28	303.68	14.81827	1.00003	.6848
2000.	.0097	36650.8	.02926	.0799	.00050	903.47	326.50	18.30263	1.00003	.6628
2200.	.0088	46749.6	.02455	.0798	.00046	1201.49	345.22	23.08892	1.00003	.6124
2400.	.0080	64818.9	.01873	.0793	.00042	1795.66	367.32	29.61808	1.00002	.5574
2600.	.0073	96346.6	.01333	.0783	.00039	2889.87	390.07	37.63526	1.00002	.5109
2800.	.0066	147167.2	.00931	.0765	.00037	4699.92	414.33	46.47267	1.00002	.4846
3000.	.0059	220733.0	.00670	.0735	.00036	7352.97	440.64	55.64640	1.00002	.4799

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.10 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.834	.01298	1.1685	.9244	-308.9	-307.6	4.968	4.68	6.38	1262.
14.	.01300	1.1442	.9243	-307.8	-306.5	5.047	4.71	6.48	1254.
15.	.01314	1.0409	.9104	-301.1	-299.8	5.509	4.92	6.98	1216.
16.	.01330	.9748	.8925	-293.9	-292.6	5.974	5.12	7.43	1190.
17.	.01347	.9112	.8774	-286.3	-284.9	6.440	5.30	7.91	1166.
18.	.01365	.8501	.8630	-278.1	-276.7	6.907	5.47	8.41	1143.
19.	.01385	.7853	.8476	-269.5	-268.1	7.375	5.62	8.95	1119.
20.	.01406	.7221	.8304	-260.3	-258.9	7.848	5.75	9.53	1094.
* 20.224	.01412	.7122	.8261	-258.1	-256.7	7.956	5.77	9.54	1090.
* 20.224	.75454	.0675	.0057	113.4	188.9	29.994	6.50	12.14	355.
21.	.79178	.0717	.0054	119.0	198.2	30.445	6.43	11.86	364.
22.	.83883	.0770	.0051	126.0	209.9	30.991	6.37	11.60	375.
23.	.88507	.0822	.0048	132.9	221.4	31.502	6.33	11.41	385.
24.	.93068	.0872	.0046	139.7	232.8	31.985	6.30	11.27	395.
25.	.97579	.0921	.0043	146.4	244.0	32.442	6.29	11.16	404.
26.	1.02048	.0969	.0041	153.0	255.1	32.878	6.27	11.07	413.
27.	1.06484	.1016	.0040	159.6	266.1	33.294	6.26	10.99	422.
28.	1.10890	.1063	.0038	166.2	277.1	33.693	6.26	10.93	431.
29.	1.15271	.1110	.0036	172.7	288.0	34.075	6.25	10.87	439.
30.	1.19630	.1156	.0035	179.2	298.8	34.443	6.25	10.83	448.
31.	1.23970	.1201	.0034	185.7	309.6	34.798	6.24	10.79	456.
32.	1.28294	.1246	.0033	192.1	320.4	35.140	6.24	10.75	463.
33.	1.32603	.1291	.0032	198.5	331.1	35.470	6.23	10.72	471.
34.	1.36898	.1336	.0031	204.9	341.8	35.789	6.23	10.69	479.
36.	1.45454	.1425	.0029	217.7	363.2	36.399	6.23	10.64	493.
38.	1.53972	.1512	.0027	230.4	384.4	36.973	6.22	10.60	508.
40.	1.62458	.1600	.0026	243.1	405.6	37.516	6.22	10.57	521.
42.	1.70918	.1686	.0024	255.8	426.7	38.032	6.23	10.55	535.
44.	1.79355	.1772	.0023	268.4	447.8	38.522	6.23	10.54	547.
46.	1.87774	.1858	.0022	281.1	468.9	38.991	6.25	10.53	560.
48.	1.96176	.1944	.0021	293.8	489.9	39.439	6.26	10.53	572.
50.	2.04564	.2029	.0020	306.4	511.0	39.869	6.28	10.54	583.
52.	2.12940	.2114	.0020	319.2	532.1	40.283	6.31	10.56	595.
56.	2.29661	.2284	.0018	344.8	574.4	41.067	6.39	10.62	616.
60.	2.46349	.2452	.0017	370.7	617.1	41.803	6.50	10.71	636.
65.	2.67172	.2663	.0016	403.9	671.1	42.667	6.69	10.89	658.
70.	2.87963	.2872	.0014	438.1	726.1	43.482	6.94	11.13	679.
75.	3.08729	.3081	.0013	473.7	782.4	44.259	7.25	11.42	697.
80.	3.29475	.3290	.0013	510.9	840.4	45.007	7.60	11.77	714.
90.	3.70923	.3706	.0011	591.1	962.0	46.439	8.41	12.57	744.
100.	4.12327	.4122	.0010	679.6	1092.0	47.807	9.27	13.43	773.
110.	4.53698	.4537	.0009	776.7	1230.4	49.123	10.10	14.25	800.
120.	4.95046	.4952	.0008	881.5	1376.6	50.396	10.83	14.97	827.
130.	5.36377	.5366	.0008	992.9	1529.3	51.618	11.40	15.54	855.
140.	5.77694	.5780	.0007	1109.2	1686.9	52.785	11.82	15.96	883.
160.	6.60298	.6607	.0006	1350.5	2010.8	54.947	12.21	16.35	940.
180.	7.42873	.7433	.0006	1595.1	2338.0	56.875	12.19	16.32	998.
200.	8.25429	.8260	.0005	1836.7	2662.1	58.582	11.95	16.08	1054.
220.	9.07970	.9086	.0005	2072.6	2980.5	60.099	11.63	15.76	1110.
240.	9.90502	.9911	.0004	2302.1	3292.6	61.457	11.33	15.46	1163.
260.	10.73026	1.0737	.0004	2526.1	3599.1	62.684	11.07	15.20	1214.
280.	11.55544	1.1562	.0004	2745.5	3901.0	63.803	10.87	15.00	1263.
300.	12.37968	1.2387	.0003	2961.4	4199.4	64.832	10.72	14.85	1310.
350.	14.44218	1.4450	.0003	3491.4	4935.6	67.101	10.51	14.63	1419.
400.	16.50455	1.6512	.0003	4014.4	5664.9	69.050	10.43	14.55	1518.
450.	18.56684	1.8575	.0002	4534.7	6391.4	70.763	10.41	14.53	1611.
500.	20.62908	2.0637	.0002	5055.0	7117.9	72.292	10.40	14.52	1698.
550.	22.69128	2.2700	.0002	5575.0	7844.1	73.677	10.41	14.53	1780.
600.	24.75345	2.4762	.0002	6096.0	8571.3	74.941	10.42	14.55	1859.
700.	28.87775	2.8886	.0001	7140.9	10028.7	77.189	10.48	14.61	2006.
800.	33.00201	3.3011	.0001	8193.4	11493.6	79.143	10.57	14.70	2142.
900.	37.12624	3.7135	.0001	9256.7	12969.3	80.880	10.70	14.82	2268.
1000.	41.25045	4.1259	.0001	10333.9	14459.0	82.452	10.86	14.98	2386.
1200.	49.49885	4.9508	.0001	12544.2	17494.0	85.206	11.24	15.37	2601.
1400.	57.74736	5.7756	.0001	14837.2	20611.9	87.613	11.68	15.81	2795.
1600.	65.99738	6.6004	.0001	17220.5	23820.2	89.732	12.15	16.28	2974.
1800.	74.25729	7.4253	.0001	19715.2	27140.9	91.649	12.78	16.92	3135.
2000.	82.55973	8.2501	.0001	22395.0	30651.0	93.563	13.97	18.19	3277.
2200.	90.99757	9.0750	.0000	25437.9	34537.7	96.086	16.46	20.89	3393.
2400.	99.78068	9.8998	.0000	29226.4	39204.5	99.159	21.30	26.23	3491.
2600.	109.30674	10.7246	.0000	34397.9	45328.6	102.909	29.75	35.75	3588.
2800.	120.23330	11.5495	.0000	41887.9	53911.2	107.479	42.99	51.10	3702.
3000.	133.52968	12.3743	.0000	52916.7	66269.7	113.034	61.69	73.70	3839.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.10 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.834	77.0685	621.7	.25639	90.0543	.01026	73.01	255.39	.00053	1.25176	2.2323
14.	76.9216	617.1	.25492	88.0151	.01050	74.68	249.37	.00054	1.25124	2.1639
15.	76.0988	607.3	.24330	79.2124	.01149	83.15	219.54	.00056	1.24835	1.8428
16.	75.1978	610.0	.23204	73.3062	.01218	89.01	195.44	.00057	1.24519	1.6308
17.	74.2500	609.5	.22298	67.6550	.01297	92.85	175.96	.00057	1.24187	1.4981
18.	73.2568	606.6	.21545	62.2739	.01386	95.55	159.92	.00056	1.23840	1.4069
19.	72.2131	598.8	.20897	56.7088	.01495	97.09	146.46	.00054	1.23475	1.3501
20.	71.1039	588.9	.20322	51.3422	.01617	98.44	134.88	.00052	1.23089	1.3051
* 20.224	70.8360	588.4	.20198	50.4463	.01638	98.84	132.43	.00052	1.22996	1.2911
* 20.224	1.3253	188.9	.06666	.0894	.06427	16.89	11.25	.00378	1.00400	.8085
21.	1.2630	197.5	.06698	.0906	.06004	17.38	11.66	.00418	1.00381	.7956
22.	1.1921	208.8	.06722	.0918	.05556	18.06	12.19	.00470	1.00360	.7829
23.	1.1299	220.1	.06733	.0929	.05186	18.76	12.71	.00524	1.00341	.7729
24.	1.0745	231.3	.06738	.0937	.04872	19.49	13.22	.00579	1.00324	.7646
25.	1.0248	242.5	.06739	.0944	.04600	20.23	13.73	.00637	1.00309	.7576
26.	.9799	253.7	.06738	.0950	.04362	20.97	14.24	.00696	1.00296	.7516
27.	.9391	264.8	.06736	.0955	.04151	21.71	14.74	.00757	1.00283	.7463
28.	.9018	275.9	.06733	.0959	.03961	22.46	15.23	.00820	1.00272	.7414
29.	.8675	286.9	.06730	.0963	.03791	23.20	15.72	.00885	1.00262	.7369
30.	.8359	297.8	.06727	.0966	.03636	23.95	16.21	.00953	1.00252	.7326
31.	.8066	308.7	.06725	.0969	.03494	24.64	16.69	.01020	1.00243	.7304
32.	.7795	319.6	.06722	.0971	.03364	25.33	17.16	.01088	1.00235	.7283
33.	.7541	330.4	.06720	.0974	.03244	26.02	17.63	.01159	1.00227	.7264
34.	.7305	341.2	.06718	.0976	.03133	26.71	18.10	.01231	1.00220	.7242
36.	.6875	362.7	.06713	.0979	.02934	28.10	19.01	.01383	1.00207	.7201
38.	.6495	384.1	.06708	.0982	.02760	29.49	19.91	.01541	1.00196	.7160
40.	.6155	405.5	.06701	.0985	.02607	30.88	20.79	.01708	1.00186	.7121
42.	.5851	427.0	.06692	.0987	.02471	32.26	21.66	.01881	1.00176	.7086
44.	.5576	448.6	.06679	.0988	.02349	33.64	22.51	.02061	1.00168	.7052
46.	.5326	470.3	.06663	.0990	.02239	35.03	23.35	.02248	1.00161	.7020
48.	.5097	492.3	.06643	.0991	.02140	36.41	24.17	.02442	1.00154	.6991
50.	.4888	514.5	.06617	.0992	.02049	37.80	24.98	.02641	1.00147	.6965
52.	.4696	537.2	.06585	.0993	.01965	39.19	25.77	.02845	1.00142	.6944
56.	.4354	583.9	.06499	.0994	.01818	41.96	27.33	.03268	1.00131	.6914
60.	.4059	633.1	.06384	.0995	.01692	44.81	28.84	.03710	1.00122	.6895
65.	.3743	699.2	.06198	.0997	.01557	48.67	30.67	.04299	1.00113	.6863
70.	.3473	771.1	.05972	.0997	.01443	52.52	32.45	.04894	1.00105	.6874
75.	.3239	849.6	.05718	.0998	.01345	56.37	34.17	.05485	1.00098	.6925
80.	.3035	934.9	.05450	.0999	.01259	60.27	35.85	.06074	1.00091	.7001
90.	.2696	1125.4	.04923	.0999	.01117	70.17	39.08	.07455	1.00081	.6999
100.	.2425	1337.7	.04461	.1000	.01004	80.07	42.16	.08852	1.00073	.7069
110.	.2204	1563.4	.04093	.1000	.00912	92.20	44.75	.10567	1.00066	.6917
120.	.2020	1792.9	.03819	.1000	.00835	102.83	47.59	.12242	1.00061	.6928
130.	.1864	2017.5	.03625	.1000	.00770	112.88	50.33	.14024	1.00056	.6930
140.	.1731	2231.5	.03497	.1000	.00715	121.83	53.00	.15878	1.00052	.6942
160.	.1514	2613.7	.03383	.1001	.00625	136.40	58.15	.19836	1.00046	.6968
180.	.1346	2936.5	.03390	.1001	.00556	147.56	63.07	.24184	1.00041	.6974
200.	.1211	3215.0	.03457	.1001	.00500	156.65	67.80	.28957	1.00037	.6958
220.	.1101	3467.7	.03550	.1001	.00454	164.63	72.38	.34143	1.00033	.6930
240.	.1010	3710.4	.03645	.1001	.00417	172.08	76.83	.39699	1.00030	.6901
260.	.0932	3953.2	.03728	.1001	.00385	179.35	81.15	.45577	1.00028	.6878
280.	.0865	4201.0	.03797	.1001	.00357	186.60	85.37	.51753	1.00026	.6862
300.	.0808	4455.4	.03850	.1001	.00333	193.91	89.48	.58208	1.00024	.6851
350.	.0692	5123.7	.03927	.1001	.00286	212.52	99.40	.75505	1.00021	.6845
400.	.0606	5822.2	.03958	.1000	.00250	231.41	108.87	.94496	1.00018	.6845
450.	.0539	6540.8	.03966	.1000	.00222	250.25	117.95	1.15120	1.00016	.6848
500.	.0485	7264.8	.03967	.1000	.00200	268.84	126.70	1.37457	1.00015	.6846
550.	.0441	7995.9	.03964	.1000	.00182	287.09	135.18	1.61369	1.00013	.6843
600.	.0404	8732.3	.03956	.1000	.00167	305.02	143.41	1.86822	1.00012	.6840
700.	.0346	10226.5	.03936	.1000	.00143	340.17	159.23	2.42129	1.00010	.6837
800.	.0303	11760.2	.03902	.1000	.00125	374.85	174.35	3.03031	1.00009	.6835
900.	.0269	13344.2	.03856	.1000	.00111	409.60	188.89	3.69306	1.00008	.6836
1000.	.0242	14985.9	.03799	.1000	.00100	444.69	202.95	4.40754	1.00007	.6838
1200.	.0202	18444.1	.03669	.1000	.00083	511.15	229.87	5.92711	1.00006	.6911
1400.	.0173	22136.8	.03530	.1000	.00071	583.71	255.49	7.67556	1.00005	.6920
1600.	.0152	26050.3	.03395	.1000	.00062	659.22	280.05	9.62086	1.00005	.6916
1800.	.0135	30461.4	.03229	.1000	.00056	749.49	303.68	11.83865	1.00004	.6857
2000.	.0121	36358.3	.02954	.0999	.00050	892.15	326.49	14.57561	1.00004	.6658
2200.	.0110	45827.4	.02513	.0997	.00046	1166.18	345.18	18.28978	1.00003	.6183
2400.	.0100	62449.1	.01952	.0992	.00042	1705.60	367.20	23.35092	1.00003	.5646
2600.	.0091	91186.0	.01413	.0981	.00039	2694.86	389.76	29.66647	1.00003	.5170
2800.	.0083	137449.7	.00999	.0961	.00037	4334.33	413.69	36.71136	1.00003	.4878
3000.	.0075	204885.4	.00721	.0927	.00036	6758.73	439.62	44.08577	1.00002	.4794

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.101325 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.835	.01298	1.1686	.9244	-308.9	-307.6	4.968	4.68	6.38	1263.
	14.	.01300	1.1444	.9243	-307.8	-306.5	5.047	4.71	6.48	1254.
	15.	.01314	1.0411	.9105	-301.1	-299.8	5.508	4.92	6.98	1216.
	16.	.01330	.9750	.8926	-293.9	-292.6	5.974	5.12	7.43	1190.
	17.	.01347	.9113	.8775	-286.3	-284.9	6.440	5.30	7.90	1166.
	18.	.01365	.8502	.8630	-278.1	-276.7	6.906	5.47	8.41	1143.
	19.	.01385	.7854	.8477	-269.5	-268.1	7.375	5.62	8.95	1119.
	20.	.01406	.7222	.8305	-260.3	-258.8	7.848	5.75	9.52	1094.
*	20.268	.01413	.7093	.8253	-257.7	-256.2	7.977	5.78	9.66	1089.
*	20.268	.74739	.0675	.0058	113.6	189.3	29.967	6.50	12.15	355.
	21.	.78035	.0715	.0055	118.8	197.9	30.383	6.44	11.89	363.
	22.	.82689	.0768	.0052	125.9	209.7	30.929	6.37	11.52	374.
	23.	.87260	.0820	.0049	132.8	221.2	31.442	6.33	11.43	385.
	24.	.91769	.0870	.0046	139.6	232.5	31.925	6.31	11.29	395.
	25.	.96226	.0919	.0044	146.3	243.8	32.383	6.29	11.17	404.
	26.	1.00643	.0968	.0042	152.9	254.9	32.819	6.27	11.08	413.
	27.	1.05025	.1015	.0040	159.5	265.9	33.236	6.26	11.00	422.
	28.	1.09378	.1062	.0039	166.1	276.9	33.635	6.26	10.94	431.
	29.	1.13705	.1109	.0037	172.6	287.8	34.018	6.25	10.88	439.
	30.	1.18011	.1154	.0036	179.1	298.7	34.386	6.25	10.83	448.
	31.	1.22297	.1200	.0034	185.6	309.5	34.741	6.24	10.79	456.
	32.	1.26567	.1245	.0033	192.0	320.3	35.083	6.24	10.76	463.
	33.	1.30822	.1290	.0032	198.4	331.0	35.413	6.23	10.72	471.
	34.	1.35063	.1335	.0031	204.9	341.7	35.733	6.23	10.69	479.
	36.	1.43512	.1424	.0029	217.6	363.0	36.343	6.23	10.65	493.
	38.	1.51922	.1512	.0027	230.4	384.3	36.917	6.22	10.61	508.
	40.	1.60300	.1599	.0026	243.1	405.5	37.461	6.22	10.58	521.
	42.	1.68652	.1686	.0025	255.7	426.6	37.976	6.23	10.56	535.
	44.	1.76982	.1772	.0024	268.4	447.7	38.467	6.23	10.54	547.
	46.	1.85292	.1858	.0022	281.0	468.8	38.935	6.25	10.53	560.
	48.	1.93587	.1943	.0021	293.7	489.9	39.384	6.26	10.53	572.
	50.	2.01867	.2029	.0021	306.4	510.9	39.814	6.28	10.54	583.
	52.	2.10135	.2114	.0020	319.1	532.0	40.228	6.31	10.56	595.
	56.	2.26641	.2283	.0018	344.7	574.4	41.012	6.39	10.62	616.
	60.	2.43113	.2452	.0017	370.7	617.0	41.748	6.50	10.71	636.
	65.	2.63666	.2662	.0016	403.9	671.0	42.612	6.69	10.89	658.
	70.	2.84187	.2872	.0015	438.1	726.0	43.427	6.94	11.13	679.
	75.	3.04684	.3081	.0014	473.7	782.4	44.205	7.25	11.42	697.
	80.	3.25161	.3290	.0013	510.9	840.4	44.953	7.60	11.77	714.
	90.	3.66069	.3706	.0011	591.1	962.0	46.384	8.41	12.57	744.
	100.	4.06933	.4122	.0010	679.6	1091.9	47.753	9.27	13.43	773.
	110.	4.47765	.4537	.0009	776.6	1230.3	49.069	10.10	14.25	800.
	120.	4.88574	.4952	.0008	881.5	1376.6	50.341	10.83	14.97	827.
	130.	5.29365	.5366	.0008	992.9	1529.3	51.563	11.40	15.54	855.
	140.	5.70143	.5780	.0007	1109.2	1686.9	52.731	11.82	15.96	883.
	160.	6.51668	.6607	.0006	1350.5	2010.8	54.893	12.21	16.35	940.
	180.	7.33165	.7434	.0006	1595.1	2338.0	56.820	12.19	16.32	998.
	200.	8.14642	.8260	.0005	1836.7	2662.1	58.527	11.95	16.08	1054.
	220.	8.96105	.9086	.0005	2072.5	2980.5	60.045	11.63	15.76	1110.
	240.	9.77558	.9911	.0004	2302.1	3292.6	61.403	11.33	15.46	1163.
	260.	10.59003	1.0737	.0004	2526.1	3599.1	62.630	11.07	15.20	1214.
	280.	11.40442	1.1563	.0004	2745.5	3901.0	63.749	10.87	15.00	1263.
	300.	12.21788	1.2387	.0003	2961.4	4199.4	64.778	10.72	14.85	1310.
	350.	14.25342	1.4450	.0003	3491.4	4935.6	67.047	10.51	14.63	1419.
	400.	16.28883	1.6513	.0003	4014.4	5664.9	68.996	10.43	14.55	1518.
	450.	18.32416	1.8575	.0002	4534.7	6391.4	70.708	10.41	14.53	1611.
	500.	20.35943	2.0638	.0002	5055.0	7117.9	72.238	10.40	14.52	1698.
	550.	22.39466	2.2700	.0002	5575.0	7844.1	73.623	10.41	14.53	1780.
	600.	24.42987	2.4762	.0002	6096.0	8571.3	74.887	10.42	14.55	1859.
	700.	28.50024	2.8887	.0001	7140.9	10028.7	77.134	10.48	14.61	2006.
	800.	32.57056	3.3011	.0001	8193.4	11493.6	79.089	10.57	14.70	2142.
	900.	36.64086	3.7135	.0001	9256.7	12969.3	80.826	10.70	14.82	2268.
	1000.	40.71114	4.1259	.0001	10333.9	14459.0	82.398	10.86	14.98	2386.
	1200.	48.85168	4.9508	.0001	12544.2	17494.1	85.151	11.24	15.37	2601.
	1400.	56.99233	5.7756	.0001	14837.2	20611.9	87.558	11.68	15.81	2795.
	1600.	65.13445	6.6005	.0001	17220.5	23820.2	89.677	12.15	16.28	2974.
	1800.	73.28628	7.4253	.0001	19714.9	27140.7	91.594	12.77	16.92	3136.
	2000.	81.47980	8.2501	.0001	22393.8	30649.8	93.508	13.97	18.18	3277.
	2200.	89.80607	9.0750	.0000	25433.9	34533.5	96.029	16.44	20.86	3393.
	2400.	98.47087	9.8998	.0000	29215.1	39192.6	99.100	21.25	26.17	3491.
	2600.	107.86410	10.7247	.0000	34370.5	45299.9	102.842	29.64	35.53	3588.
	2800.	118.63048	11.5495	.0000	41829.7	53849.9	107.400	42.80	50.89	3702.
	3000.	131.72066	12.3743	.0000	52805.4	66152.0	112.936	61.40	73.34	3839.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.101325 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(dH/dV)_P$	$V(dP/dU)_V$	$-V(dP/dV)_T$	$(dV/dT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	13.835	77.0693	621.7	.25638	90.0617	.01026	73.01	255.40	.00053	1.25176	2.2322
	14.	76.9227	617.2	.25493	88.0322	.01050	74.68	249.39	.00054	1.25125	2.1640
	15.	76.1000	607.3	.24331	79.2241	.01149	83.16	219.56	.00056	1.24835	1.8429
	16.	75.1991	610.1	.23205	73.3174	.01217	89.01	195.46	.00057	1.24519	1.6309
	17.	74.2514	609.6	.22299	67.6660	.01297	92.85	175.98	.00057	1.24187	1.4981
	18.	73.2583	606.7	.21546	62.2852	.01386	95.56	159.94	.00056	1.23840	1.4069
	19.	72.2148	598.9	.20898	56.7137	.01494	97.10	146.47	.00054	1.23476	1.3501
	20.	71.1057	589.0	.20322	51.3532	.01617	98.44	134.89	.00052	1.23089	1.3051
*	20.268	70.7859	587.9	.20175	50.2056	.01644	98.92	131.98	.00052	1.22978	1.2893
*	20.268	1.3380	189.1	.06667	.0903	.06424	16.94	11.28	.00375	1.00404	.8091
	21.	1.2815	197.3	.06697	.0916	.06027	17.40	11.67	.00411	1.00387	.7970
	22.	1.2094	208.6	.06721	.0929	.05573	18.08	12.19	.00463	1.00365	.7840
	23.	1.1460	219.8	.06734	.0940	.05200	18.78	12.71	.00516	1.00346	.7738
	24.	1.0897	231.1	.06739	.0948	.04883	19.50	13.23	.00571	1.00329	.7654
	25.	1.0392	242.3	.06740	.0955	.04610	20.24	13.74	.00628	1.00313	.7582
	26.	.9936	253.5	.06739	.0961	.04370	20.98	14.24	.00686	1.00300	.7522
	27.	.9522	264.6	.06736	.0967	.04157	21.72	14.74	.00746	1.00287	.7468
	28.	.9143	275.7	.06734	.0971	.03967	22.47	15.24	.00809	1.00276	.7418
	29.	.8795	286.7	.06731	.0975	.03796	23.21	15.73	.00873	1.00265	.7373
	30.	.8474	297.7	.06728	.0978	.03640	23.96	16.21	.00940	1.00256	.7330
	31.	.8177	308.6	.06725	.0981	.03498	24.65	16.69	.01006	1.00247	.7308
	32.	.7901	319.4	.06723	.0984	.03367	25.34	17.16	.01073	1.00238	.7286
	33.	.7644	330.3	.06720	.0986	.03247	26.02	17.63	.01143	1.00230	.7266
	34.	.7404	341.0	.06718	.0988	.03136	26.72	18.10	.01215	1.00223	.7245
	36.	.6968	362.5	.06714	.0992	.02936	28.10	19.02	.01364	1.00210	.7203
	38.	.6582	384.0	.06708	.0995	.02762	29.49	19.91	.01521	1.00198	.7162
	40.	.6238	405.4	.06701	.0997	.02609	30.88	20.80	.01685	1.00188	.7123
	42.	.5929	426.9	.06692	.0999	.02472	32.27	21.66	.01856	1.00179	.7087
	44.	.5650	448.5	.06680	.1001	.02350	33.65	22.51	.02034	1.00170	.7053
	46.	.5397	470.2	.06664	.1003	.02240	35.03	23.35	.02218	1.00163	.7021
	48.	.5166	492.2	.06643	.1004	.02140	36.42	24.17	.02409	1.00156	.6992
	50.	.4954	514.5	.06617	.1005	.02049	37.81	24.98	.02606	1.00149	.6966
	52.	.4759	537.1	.06585	.1006	.01966	39.19	25.78	.02808	1.00143	.6944
	56.	.4412	583.8	.06499	.1007	.01819	41.97	27.33	.03225	1.00133	.6914
	60.	.4113	633.1	.06384	.1009	.01692	44.81	28.84	.03661	1.00124	.6896
	65.	.3793	699.1	.06198	.1010	.01558	48.67	30.68	.04242	1.00114	.6864
	70.	.3519	771.0	.05972	.1011	.01443	52.53	32.45	.04829	1.00106	.6875
	75.	.3282	849.5	.05718	.1011	.01345	56.37	34.17	.05413	1.00099	.6925
	80.	.3075	934.9	.05451	.1012	.01259	60.27	35.85	.05994	1.00093	.7001
	90.	.2732	1125.4	.04923	.1012	.01117	70.17	39.08	.07357	1.00082	.7000
	100.	.2457	1337.7	.04461	.1013	.01004	80.07	42.16	.08736	1.00074	.7070
	110.	.2233	1563.3	.04093	.1013	.00912	92.20	44.75	.10428	1.00067	.6917
	120.	.2047	1792.9	.03819	.1013	.00835	102.84	47.59	.12082	1.00062	.6928
	130.	.1889	2017.5	.03625	.1014	.00770	112.88	50.33	.13841	1.00057	.6930
	140.	.1754	2231.5	.03497	.1014	.00715	121.83	53.00	.15671	1.00053	.6942
	160.	.1535	2613.8	.03384	.1014	.00625	136.40	58.15	.19576	1.00046	.6968
	180.	.1364	2936.5	.03390	.1014	.00556	147.56	63.07	.23868	1.00041	.6974
	200.	.1228	3215.0	.03457	.1014	.00500	156.65	67.80	.28579	1.00037	.6958
	220.	.1116	3467.8	.03550	.1014	.00454	164.63	72.38	.33697	1.00034	.6930
	240.	.1023	3710.4	.03645	.1014	.00417	172.08	76.83	.39180	1.00031	.6901
	260.	.0944	3953.3	.03728	.1014	.00385	179.35	81.15	.44981	1.00028	.6878
	280.	.0877	4201.0	.03797	.1014	.00357	186.60	85.37	.51077	1.00026	.6862
	300.	.0818	4455.4	.03850	.1014	.00333	193.91	89.48	.57447	1.00025	.6851
	350.	.0702	5123.7	.03927	.1014	.00286	212.52	99.40	.74518	1.00021	.6845
	400.	.0614	5822.2	.03958	.1014	.00250	231.41	108.87	.93261	1.00018	.6845
	450.	.0546	6540.9	.03966	.1014	.00222	250.25	117.95	1.13615	1.00016	.6848
	500.	.0491	7264.9	.03967	.1014	.00200	268.84	126.70	1.35660	1.00015	.6846
	550.	.0447	7995.9	.03964	.1014	.00182	287.09	135.18	1.59260	1.00013	.6843
	600.	.0409	8732.3	.03958	.1014	.00167	305.02	143.41	1.84380	1.00012	.6840
	700.	.0351	10226.5	.03936	.1014	.00143	340.17	159.23	2.38964	1.00011	.6837
	800.	.0307	11760.3	.03902	.1014	.00125	374.85	174.35	2.99069	1.00009	.6835
	900.	.0273	13344.2	.03856	.1013	.00111	409.60	188.89	3.64478	1.00008	.6836
	1000.	.0246	14985.9	.03799	.1013	.00100	444.69	202.95	4.34992	1.00007	.6838
	1200.	.0205	18444.1	.03669	.1013	.00083	511.15	229.87	5.84961	1.00006	.6911
	1400.	.0175	22136.8	.03530	.1013	.00071	583.71	255.49	7.57520	1.00005	.6920
	1600.	.0154	26049.7	.03395	.1013	.00062	659.20	280.05	9.49493	1.00005	.6916
	1800.	.0136	30457.5	.03229	.1013	.00056	749.33	303.68	11.68297	1.00004	.6858
	2000.	.0123	36342.1	.02956	.1013	.00050	891.52	326.49	14.38133	1.00004	.6659
	2200.	.0111	45776.1	.02516	.1011	.00046	1164.21	345.18	18.04045	1.00003	.6186
	2400.	.0102	62317.2	.01957	.1005	.00042	1700.59	367.19	23.03639	1.00003	.5651
	2600.	.0093	90898.4	.01418	.0994	.00039	2683.99	389.74	29.25278	1.00003	.5174
	2800.	.0084	136906.5	.01003	.0974	.00037	4313.89	413.65	36.20361	1.00003	.4880
	3000.	.0076	203993.2	.00725	.0939	.00036	6725.27	439.56	43.48332	1.00002	.4793

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.15 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.851	.01297	1.1717	.9250	-308.9	-306.9	4.969	4.68	6.38	1264.
14.	.01299	1.1520	.9249	-307.9	-305.9	5.040	4.71	6.47	1257.
15.	.01313	1.0461	.9122	-301.2	-299.3	5.501	4.92	6.97	1218.
16.	.01329	.9798	.8942	-294.0	-292.1	5.966	5.11	7.42	1192.
17.	.01346	.9161	.8791	-286.4	-284.4	6.431	5.30	7.89	1168.
18.	.01364	.8552	.8646	-278.3	-276.2	6.897	5.46	8.39	1146.
19.	.01384	.7903	.8493	-269.7	-267.6	7.365	5.61	8.93	1121.
20.	.01405	.7272	.8321	-260.5	-258.4	7.837	5.74	9.50	1097.
21.	.01429	.6608	.8128	-250.7	-248.5	8.316	5.86	10.14	1070.
* 21.672	.01447	.6202	.7984	-243.7	-241.6	8.644	5.92	10.58	1053.
* 21.672	.52255	.0673	.0084	117.6	196.0	28.842	6.59	12.84	362.
22.	.53312	.0692	.0082	120.1	200.0	29.028	6.55	12.67	366.
23.	.56639	.0751	.0077	127.5	212.5	29.582	6.46	12.25	378.
24.	.59879	.0807	.0072	134.7	224.6	30.096	6.40	11.95	388.
25.	.63055	.0861	.0068	141.8	236.4	30.579	6.36	11.73	399.
26.	.66180	.0914	.0065	148.8	248.0	31.036	6.33	11.55	408.
27.	.69263	.0965	.0062	155.6	259.5	31.469	6.31	11.42	418.
28.	.72313	.1015	.0059	162.4	270.9	31.882	6.30	11.30	427.
29.	.75333	.1065	.0056	169.1	282.1	32.277	6.29	11.21	436.
30.	.78329	.1113	.0054	175.8	293.3	32.656	6.28	11.13	444.
31.	.81304	.1161	.0052	182.4	304.4	33.020	6.27	11.06	453.
32.	.84260	.1209	.0050	189.0	315.4	33.370	6.26	11.00	461.
33.	.87200	.1256	.0048	195.6	326.4	33.708	6.26	10.94	469.
34.	.90126	.1302	.0047	202.1	337.3	34.034	6.25	10.90	476.
36.	.95940	.1394	.0044	215.1	359.0	34.654	6.25	10.82	491.
38.	1.01714	.1485	.0041	228.0	380.6	35.237	6.24	10.76	506.
40.	1.07455	.1574	.0039	240.9	402.1	35.788	6.24	10.71	520.
42.	1.13168	.1663	.0037	253.7	423.4	36.309	6.24	10.67	533.
44.	1.18858	.1751	.0035	266.5	444.8	36.805	6.25	10.64	546.
46.	1.24528	.1839	.0034	279.2	466.0	37.278	6.25	10.63	559.
48.	1.30182	.1926	.0032	292.0	487.3	37.730	6.27	10.62	571.
50.	1.35822	.2013	.0031	304.8	508.5	38.163	6.29	10.62	583.
52.	1.41449	.2099	.0029	317.6	529.8	38.580	6.32	10.63	594.
56.	1.52672	.2271	.0027	343.3	572.3	39.369	6.39	10.67	616.
60.	1.63861	.2441	.0025	369.4	615.2	40.108	6.50	10.76	636.
65.	1.77810	.2654	.0023	402.7	669.4	40.976	6.69	10.93	658.
70.	1.91727	.2865	.0022	437.0	724.6	41.794	6.94	11.16	679.
75.	2.05619	.3075	.0020	472.7	781.1	42.574	7.25	11.45	697.
80.	2.19491	.3285	.0019	510.0	839.2	43.324	7.60	11.79	714.
90.	2.47191	.3704	.0017	590.3	961.1	44.758	8.41	12.59	745.
100.	2.74846	.4121	.0015	678.9	1091.2	46.128	9.28	13.44	773.
110.	3.02469	.4537	.0014	776.0	1229.7	47.445	10.11	14.26	800.
120.	3.30069	.4953	.0013	881.0	1376.1	48.719	10.83	14.98	828.
130.	3.57651	.5368	.0012	992.4	1528.9	49.941	11.40	15.55	856.
140.	3.85219	.5782	.0011	1108.8	1686.6	51.110	11.82	15.96	884.
160.	4.40326	.6611	.0009	1350.1	2010.6	53.273	12.21	16.35	941.
180.	4.95405	.7438	.0008	1594.8	2337.9	55.201	12.19	16.32	998.
200.	5.50464	.8265	.0008	1836.4	2662.1	56.908	11.95	16.08	1055.
220.	6.05509	.9091	.0007	2072.3	2980.6	58.426	11.63	15.76	1110.
240.	6.60544	.9918	.0006	2301.9	3292.7	59.784	11.33	15.46	1163.
260.	7.15571	1.0744	.0006	2525.9	3599.2	61.011	11.07	15.20	1214.
280.	7.70593	1.1569	.0005	2745.3	3901.2	62.130	10.87	15.00	1263.
300.	8.25551	1.2394	.0005	2961.2	4199.6	63.160	10.72	14.85	1310.
350.	9.63066	1.4457	.0004	3491.3	4935.9	65.429	10.51	14.63	1419.
400.	11.00567	1.6520	.0004	4014.3	5665.2	67.378	10.43	14.55	1518.
450.	12.38060	1.8583	.0003	4534.6	6391.7	69.090	10.41	14.53	1611.
500.	13.75547	2.0646	.0003	5055.0	7118.3	70.620	10.40	14.53	1698.
550.	15.13031	2.2708	.0003	5574.9	7844.5	72.004	10.41	14.53	1781.
600.	16.50512	2.4770	.0003	6095.9	8571.7	73.268	10.42	14.55	1859.
700.	19.25470	2.8895	.0002	7140.9	10029.1	75.516	10.48	14.61	2007.
800.	22.00423	3.3019	.0002	8193.4	11494.0	77.471	10.57	14.70	2142.
900.	24.75374	3.7144	.0002	9256.7	12969.7	79.208	10.70	14.82	2268.
1000.	27.50323	4.1268	.0002	10333.9	14459.4	80.780	10.86	14.98	2386.
1200.	33.00218	4.9517	.0001	12544.1	17494.5	83.533	11.24	15.37	2602.
1400.	38.50118	5.7765	.0001	14837.1	20612.3	85.940	11.68	15.81	2796.
1600.	44.00101	6.6013	.0001	17219.4	23819.5	88.059	12.14	16.27	2974.
1800.	49.50621	7.4262	.0001	19708.0	27133.9	89.972	12.72	16.86	3138.
2000.	55.03455	8.2510	.0001	22362.5	30617.7	91.873	13.76	17.96	3292.
2200.	60.63661	9.0759	.0001	25325.3	34420.8	94.356	15.85	20.22	3402.
2400.	66.42663	9.9007	.0001	28908.7	38872.7	97.336	19.86	24.64	3504.
2600.	72.62115	10.7255	.0001	33632.2	44525.4	100.898	26.83	32.47	3601.
2800.	79.57865	11.5504	.0001	40260.4	52197.2	105.132	37.77	45.08	3709.
3000.	87.83039	12.3752	.0001	49798.0	62972.6	110.142	53.35	63.69	3839.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.15 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.851	77.0972	623.3	.25632	90.3332	.01024	73.22	255.70	.00054	1.25186	2.2289
14.	76.9648	620.0	.25501	88.6598	.01043	74.72	250.26	.00054	1.25139	2.1663
15.	76.1448	609.0	.24371	79.6566	.01145	83.21	220.31	.00056	1.24851	1.8463
16.	75.2472	611.7	.23242	73.7262	.01213	89.09	196.11	.00057	1.24536	1.6332
17.	74.3038	611.3	.22334	68.0668	.01292	92.95	176.57	.00057	1.24206	1.4998
18.	73.3154	608.6	.21579	62.6992	.01379	95.67	160.49	.00056	1.23860	1.4078
19.	72.2760	600.8	.20930	57.1192	.01487	97.23	146.98	.00054	1.23497	1.3505
20.	71.1714	591.1	.20352	51.7551	.01608	98.59	135.36	.00052	1.23112	1.3048
21.	69.9823	577.2	.19830	46.2470	.01758	100.14	125.13	.00051	1.22699	1.2675
* 21.672	69.1286	568.4	.19499	42.8767	.01862	100.73	118.87	.00050	1.22403	1.2490
* 21.672	1.9137	196.1	.06680	.1287	.06547	18.61	12.17	.00273	1.00578	.8398
22.	1.8757	199.9	.06699	.1299	.06337	18.79	12.34	.00285	1.00566	.8319
23.	1.7656	211.6	.06737	.1326	.05790	19.39	12.85	.00323	1.00533	.8119
24.	1.6700	223.2	.06757	.1348	.05353	20.04	13.36	.00361	1.00504	.7967
25.	1.5859	234.9	.06765	.1366	.04993	20.72	13.86	.00401	1.00479	.7847
26.	1.5110	246.5	.06768	.1381	.04688	21.41	14.36	.00442	1.00456	.7751
27.	1.4438	258.0	.06767	.1394	.04426	22.12	14.86	.00483	1.00436	.7669
28.	1.3829	269.4	.06764	.1404	.04196	22.83	15.35	.00526	1.00417	.7598
29.	1.3274	280.8	.06760	.1413	.03992	23.55	15.83	.00570	1.00401	.7535
30.	1.2767	292.0	.06757	.1421	.03810	24.28	16.31	.00615	1.00385	.7478
31.	1.2300	303.2	.06753	.1428	.03647	24.96	16.79	.00661	1.00371	.7439
32.	1.1868	314.4	.06749	.1434	.03498	25.64	17.26	.00707	1.00358	.7405
33.	1.1468	325.5	.06746	.1440	.03363	26.32	17.73	.00755	1.00346	.7373
34.	1.1096	336.5	.06744	.1445	.03239	27.00	18.19	.00804	1.00335	.7342
36.	1.0423	358.4	.06738	.1453	.03019	28.37	19.10	.00906	1.00314	.7284
38.	.9831	380.2	.06732	.1460	.02829	29.75	20.00	.01013	1.00297	.7231
40.	.9306	401.9	.06724	.1465	.02664	31.12	20.88	.01124	1.00281	.7182
42.	.8836	423.7	.06713	.1470	.02519	32.49	21.74	.01241	1.00266	.7139
44.	.8413	445.5	.06700	.1473	.02389	33.87	22.58	.01361	1.00254	.7098
46.	.8030	467.4	.06683	.1477	.02273	35.24	23.42	.01487	1.00242	.7061
48.	.7682	489.6	.06662	.1479	.02169	36.62	24.24	.01616	1.00232	.7027
50.	.7363	512.0	.06635	.1482	.02074	38.00	25.04	.01750	1.00222	.6997
52.	.7070	534.8	.06602	.1484	.01987	39.38	25.84	.01887	1.00213	.6973
56.	.6550	581.8	.06515	.1487	.01835	42.14	27.39	.02170	1.00197	.6937
60.	.6103	631.3	.06398	.1490	.01705	44.98	28.90	.02465	1.00184	.6914
65.	.5624	697.5	.06211	.1492	.01567	48.82	30.73	.02859	1.00170	.6879
70.	.5216	769.6	.05984	.1494	.01450	52.67	32.50	.03257	1.00157	.6887
75.	.4863	848.2	.05729	.1496	.01350	56.50	34.22	.03652	1.00147	.6936
80.	.4556	933.7	.05460	.1497	.01263	60.39	35.89	.04046	1.00137	.7010
90.	.4045	1124.4	.04931	.1498	.01120	70.28	39.12	.04969	1.00122	.7005
100.	.3638	1336.8	.04468	.1499	.01006	80.18	42.19	.05902	1.00110	.7074
110.	.3306	1562.6	.04098	.1500	.00913	92.24	44.76	.07041	1.00100	.6921
120.	.3030	1792.3	.03823	.1501	.00836	102.87	47.59	.08159	1.00091	.6931
130.	.2796	2017.1	.03629	.1501	.00771	112.91	50.34	.09349	1.00084	.6933
140.	.2596	2231.3	.03500	.1501	.00715	121.86	53.01	.10586	1.00078	.6944
160.	.2271	2613.9	.03386	.1501	.00626	136.42	58.15	.13226	1.00068	.6970
180.	.2019	2936.9	.03392	.1501	.00556	147.58	63.07	.16126	1.00061	.6975
200.	.1817	3215.6	.03460	.1501	.00500	156.67	67.81	.19309	1.00055	.6959
220.	.1652	3468.5	.03552	.1501	.00454	164.64	72.39	.22768	1.00050	.6930
240.	.1514	3711.3	.03646	.1501	.00417	172.10	76.83	.26473	1.00046	.6901
260.	.1397	3954.2	.03730	.1501	.00384	179.36	81.15	.30393	1.00042	.6878
280.	.1298	4202.0	.03799	.1501	.00357	186.61	85.37	.34511	1.00039	.6862
300.	.1211	4456.5	.03852	.1501	.00333	193.92	89.48	.38815	1.00036	.6852
350.	.1038	5124.9	.03929	.1501	.00286	212.53	99.40	.50349	1.00031	.6845
400.	.0909	5823.5	.03960	.1501	.00250	231.42	108.87	.63012	1.00027	.6845
450.	.0808	6542.2	.03967	.1501	.00222	250.26	117.95	.76763	1.00024	.6848
500.	.0727	7266.2	.03968	.1501	.00200	268.85	126.71	.91656	1.00022	.6846
550.	.0661	7997.3	.03965	.1501	.00182	287.10	135.18	1.07599	1.00020	.6843
600.	.0606	8733.7	.03958	.1501	.00167	305.03	143.41	1.24570	1.00018	.6840
700.	.0519	10228.0	.03937	.1501	.00143	340.17	159.23	1.61444	1.00016	.6837
800.	.0454	11761.7	.03903	.1501	.00125	374.86	174.35	2.02048	1.00014	.6835
900.	.0404	13345.8	.03856	.1501	.00111	409.60	188.89	2.46234	1.00012	.6836
1000.	.0364	14987.5	.03799	.1500	.00100	444.70	202.95	2.93869	1.00011	.6838
1200.	.0303	18445.6	.03669	.1500	.00083	511.14	229.87	3.95174	1.00009	.6911
1400.	.0260	22136.6	.03531	.1500	.00071	583.63	255.49	5.11720	1.00008	.6920
1600.	.0227	26033.2	.03398	.1500	.00062	658.47	280.05	6.41171	1.00007	.6919
1800.	.0202	30352.1	.03244	.1500	.00056	745.15	303.67	7.87596	1.00006	.6872
2000.	.0182	35984.1	.03000	.1499	.00050	874.55	326.48	9.64689	1.00005	.6705
2200.	.0165	44393.2	.02608	.1497	.00046	1111.23	345.12	11.99524	1.00005	.6281
2400.	.0151	58756.5	.02090	.1490	.00042	1565.22	367.01	15.19177	1.00005	.5777
2600.	.0138	83113.8	.01561	.1477	.00039	2389.77	389.27	19.24361	1.00004	.5288
2800.	.0126	122126.7	.01129	.1451	.00037	3757.74	412.65	23.88257	1.00004	.4950
3000.	.0114	179472.6	.00823	.1409	.00035	5805.59	437.85	28.82253	1.00003	.4803

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.20 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	C^P	VELOCITY OF SOUND M/S
* 13.868	.01297	1.1749	.9255	-308.9	-306.3	4.971	4.68	6.38	1265.
14.	.01299	1.1597	.9255	-308.0	-305.4	5.034	4.71	6.46	1260.
15.	.01312	1.0513	.9140	-301.3	-298.7	5.494	4.91	6.97	1221.
16.	.01328	.9847	.8959	-294.2	-291.5	5.959	5.11	7.41	1195.
17.	.01345	.9209	.8807	-286.5	-283.9	6.423	5.29	7.88	1171.
18.	.01363	.8603	.8662	-278.4	-275.7	6.888	5.46	8.38	1149.
19.	.01382	.7953	.8509	-269.8	-267.1	7.355	5.61	8.92	1124.
20.	.01404	.7323	.8337	-260.7	-257.9	7.826	5.74	9.48	1100.
21.	.01427	.6661	.8146	-251.0	-248.1	8.304	5.85	10.12	1073.
22.	.01454	.5995	.7928	-240.5	-237.6	8.790	5.95	10.82	1044.
* 22.805	.01478	.5396	.7723	-231.6	-228.6	9.192	6.01	11.52	1017.
* 22.805	.40014	.0661	.0112	119.9	199.9	27.996	6.66	13.55	367.
23.	.40532	.0674	.0110	121.5	202.5	28.110	6.63	13.41	369.
24.	.43157	.0738	.0102	129.3	215.6	28.668	6.52	12.84	381.
25.	.45696	.0799	.0096	136.9	228.3	29.183	6.45	12.44	392.
26.	.48170	.0856	.0090	144.2	240.6	29.665	6.40	12.15	403.
27.	.50594	.0912	.0086	151.4	252.6	30.119	6.37	11.92	413.
28.	.52976	.0966	.0081	158.5	264.4	30.549	6.35	11.74	423.
29.	.55326	.1018	.0078	165.4	276.1	30.958	6.33	11.59	432.
30.	.57647	.1070	.0074	172.3	287.6	31.349	6.32	11.46	441.
31.	.59944	.1121	.0071	179.1	299.0	31.723	6.30	11.36	449.
32.	.62222	.1170	.0069	185.9	310.3	32.083	6.29	11.27	458.
33.	.64481	.1219	.0066	192.6	321.6	32.428	6.29	11.19	466.
34.	.66725	.1268	.0064	199.3	332.7	32.761	6.28	11.12	474.
36.	.71173	.1363	.0060	212.5	354.8	33.393	6.26	11.01	489.
38.	.75578	.1457	.0056	225.6	376.7	33.986	6.26	10.92	504.
40.	.79948	.1549	.0053	238.6	398.5	34.544	6.25	10.85	518.
42.	.84289	.1640	.0050	251.6	420.2	35.072	6.25	10.79	532.
44.	.88607	.1730	.0047	264.5	441.7	35.573	6.26	10.75	545.
46.	.92904	.1819	.0045	277.4	463.2	36.051	6.26	10.72	558.
48.	.97185	.1908	.0043	290.2	484.6	36.506	6.28	10.70	570.
50.	1.01450	.1996	.0041	303.1	506.0	36.943	6.30	10.70	582.
52.	1.05704	.2084	.0040	316.0	527.4	37.363	6.32	10.70	594.
56.	1.14178	.2258	.0037	341.9	570.2	38.157	6.40	10.73	615.
60.	1.22618	.2430	.0034	368.1	613.3	38.900	6.51	10.81	635.
65.	1.33130	.2645	.0031	401.5	667.8	39.771	6.70	10.97	658.
70.	1.43610	.2858	.0029	435.9	723.2	40.592	6.95	11.20	679.
75.	1.54066	.3069	.0027	471.7	779.8	41.374	7.25	11.48	697.
80.	1.64501	.3281	.0025	509.1	838.1	42.126	7.60	11.82	714.
90.	1.85326	.3701	.0022	589.5	960.1	43.562	8.41	12.61	745.
100.	2.06107	.4120	.0020	678.2	1090.4	44.934	9.28	13.46	773.
110.	2.26855	.4537	.0018	775.4	1229.1	46.253	10.11	14.28	801.
120.	2.47580	.4954	.0017	880.4	1375.6	47.528	10.83	14.99	828.
130.	2.68288	.5370	.0015	991.9	1528.5	48.751	11.40	15.56	856.
140.	2.88982	.5785	.0014	1108.3	1686.3	49.920	11.82	15.97	884.
160.	3.30341	.6615	.0013	1349.7	2010.4	52.084	12.21	16.36	941.
180.	3.71671	.7443	.0011	1594.4	2337.8	54.012	12.19	16.33	999.
200.	4.12982	.8270	.0010	1836.1	2662.1	55.720	11.95	16.08	1055.
220.	4.54279	.9097	.0009	2072.0	2980.6	57.238	11.63	15.77	1110.
240.	4.95565	.9924	.0008	2301.7	3292.8	58.596	11.33	15.46	1164.
260.	5.36844	1.0750	.0008	2525.7	3599.4	59.824	11.07	15.20	1215.
280.	5.78117	1.1576	.0007	2745.1	3901.4	60.943	10.87	15.00	1264.
300.	6.19343	1.2401	.0007	2961.1	4199.8	61.973	10.72	14.85	1311.
350.	7.22489	1.4465	.0006	3491.1	4936.1	64.242	10.51	14.64	1419.
400.	8.25622	1.6528	.0005	4014.2	5665.5	66.191	10.43	14.55	1519.
450.	9.28747	1.8591	.0004	4534.5	6392.0	67.904	10.41	14.53	1611.
500.	10.31867	2.0654	.0004	5054.9	7118.6	69.433	10.40	14.53	1698.
550.	11.34982	2.2716	.0004	5574.9	7844.9	70.818	10.41	14.53	1781.
600.	12.38096	2.4779	.0003	6095.9	8572.1	72.082	10.42	14.55	1860.
700.	14.44317	2.8904	.0003	7140.8	10029.5	74.330	10.48	14.61	2007.
800.	16.50534	3.3028	.0003	8193.3	11494.4	76.285	10.57	14.70	2143.
900.	18.56749	3.7152	.0002	9256.7	12970.2	78.021	10.70	14.82	2269.
1000.	20.62962	4.1277	.0002	10333.9	14459.8	79.593	10.86	14.98	2386.
1200.	24.75385	4.9525	.0002	12544.1	17494.9	82.347	11.24	15.37	2602.
1400.	28.87810	5.7774	.0001	14837.0	20612.6	84.754	11.68	15.81	2796.
1600.	33.00288	6.6022	.0001	17218.7	23819.3	86.872	12.13	16.26	2974.
1800.	37.13116	7.4271	.0001	19703.7	27130.0	88.783	12.68	16.82	3139.
2000.	41.27447	8.2519	.0001	22343.1	30598.0	90.676	13.63	17.82	3285.
2200.	45.46565	9.0768	.0001	25258.2	34351.3	93.135	15.49	19.83	3408.
2400.	49.77894	9.9016	.0001	28719.3	38675.0	96.060	19.01	23.69	3513.
2600.	54.35499	10.7264	.0001	33175.7	44046.7	99.510	25.09	30.51	3610.
2800.	59.42684	11.5513	.0001	39289.7	51175.0	103.543	34.64	41.48	3716.
3000.	65.34074	12.3761	.0001	47934.6	61002.7	108.228	48.29	57.68	3840.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.20 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	13.868	77.1259	624.9	.25626	90.6124	.01021	73.43	256.01	.00054	1.25196	2.2255
	14.	77.0078	622.9	.25509	89.3027	.01036	74.76	251.16	.00054	1.25155	2.1687
	15.	76.1907	610.6	.24412	80.0995	.01141	83.27	221.08	.00056	1.24867	1.8499
	16.	75.2962	613.4	.23280	74.1448	.01208	89.17	196.79	.00058	1.24553	1.6356
	17.	74.3574	613.0	.22370	68.4766	.01286	93.05	177.19	.00057	1.24224	1.5014
	18.	73.3736	610.5	.21613	63.1221	.01372	95.79	161.05	.00056	1.23880	1.4087
	19.	72.3384	602.9	.20963	57.5276	.01479	97.36	147.49	.00054	1.23519	1.3510
	20.	71.2386	593.3	.20383	52.1662	.01598	98.74	135.84	.00053	1.23136	1.3046
	21.	70.0571	579.6	.19860	46.6655	.01746	100.31	125.59	.00051	1.22725	1.2666
	22.	68.7873	563.1	.19370	41.2384	.01923	101.11	116.47	.00049	1.22284	1.2469
*	22.805	67.6762	544.6	.18973	36.5158	.02115	101.20	109.69	.00047	1.21900	1.2486
*	22.805	2.4991	200.5	.06703	.1652	.06756	20.09	12.91	.00214	1.00755	.8709
	23.	2.4672	202.9	.06715	.1663	.06610	20.18	13.01	.00220	1.00745	.8646
	24.	2.3171	215.0	.06761	.1710	.05973	20.70	13.51	.00250	1.00700	.8380
	25.	2.1884	227.1	.06784	.1747	.05478	21.29	14.00	.00282	1.00661	.8183
	26.	2.0760	239.1	.06793	.1778	.05079	21.92	14.50	.00313	1.00627	.8032
	27.	1.9765	251.1	.06795	.1802	.04747	22.58	14.98	.00345	1.00597	.7910
	28.	1.8876	262.9	.06793	.1823	.04464	23.25	15.47	.00378	1.00570	.7808
	29.	1.8075	274.6	.06790	.1841	.04219	23.94	15.95	.00411	1.00546	.7722
	30.	1.7347	286.3	.06785	.1856	.04005	24.63	16.43	.00446	1.00524	.7646
	31.	1.6682	297.8	.06781	.1869	.03815	25.30	16.90	.00481	1.00504	.7588
	32.	1.6072	309.2	.06776	.1881	.03645	25.96	17.37	.00516	1.00485	.7537
	33.	1.5508	320.5	.06772	.1891	.03491	26.63	17.83	.00552	1.00468	.7492
	34.	1.4987	331.8	.06769	.1900	.03352	27.30	18.29	.00590	1.00452	.7449
	36.	1.4050	354.1	.06763	.1915	.03108	28.65	19.19	.00667	1.00424	.7372
	38.	1.3231	376.2	.06756	.1927	.02902	30.01	20.08	.00748	1.00399	.7305
	40.	1.2508	398.3	.06747	.1937	.02723	31.38	20.96	.00832	1.00377	.7246
	42.	1.1864	420.3	.06735	.1946	.02568	32.74	21.82	.00920	1.00358	.7193
	44.	1.1286	442.4	.06721	.1953	.02430	34.10	22.66	.01012	1.00340	.7146
	46.	1.0764	464.6	.06703	.1958	.02308	35.46	23.49	.01106	1.00325	.7103
	48.	1.0290	486.9	.06681	.1963	.02198	36.83	24.31	.01204	1.00310	.7064
	50.	.9857	509.6	.06653	.1968	.02099	38.20	25.11	.01304	1.00297	.7030
	52.	.9460	532.5	.06619	.1971	.02009	39.57	25.90	.01408	1.00285	.7002
	56.	.8758	579.8	.06531	.1977	.01851	42.33	27.45	.01621	1.00264	.6961
	60.	.8155	629.5	.06413	.1982	.01718	45.15	28.95	.01843	1.00246	.6934
	65.	.7511	695.9	.06224	.1986	.01577	48.98	30.78	.02140	1.00226	.6894
	70.	.6963	768.2	.05996	.1990	.01458	52.82	32.55	.02439	1.00210	.6899
	75.	.6491	846.9	.05740	.1992	.01356	56.63	34.26	.02736	1.00196	.6947
	80.	.6079	932.5	.05470	.1994	.01268	60.52	35.93	.03032	1.00183	.7019
	90.	.5396	1123.3	.04939	.1997	.01122	70.40	39.15	.03726	1.00163	.7011
	100.	.4852	1335.9	.04474	.1999	.01007	80.29	42.23	.04427	1.00146	.7078
	110.	.4408	1561.9	.04104	.2000	.00914	92.28	44.77	.05279	1.00133	.6925
	120.	.4039	1791.8	.03827	.2001	.00837	102.91	47.60	.06118	1.00122	.6934
	130.	.3727	2016.7	.03633	.2002	.00772	112.95	50.35	.07011	1.00112	.6936
	140.	.3460	2231.1	.03503	.2002	.00716	121.89	53.01	.07939	1.00104	.6947
	160.	.3027	2614.0	.03389	.2002	.00626	136.45	58.15	.09921	1.00091	.6971
	180.	.2691	2937.3	.03394	.2003	.00556	147.60	63.07	.12097	1.00081	.6977
	200.	.2421	3216.2	.03462	.2003	.00500	156.69	67.81	.14485	1.00073	.6960
	220.	.2201	3469.3	.03554	.2003	.00454	164.66	72.39	.17080	1.00066	.6931
	240.	.2018	3712.1	.03648	.2003	.00417	172.11	76.83	.19860	1.00061	.6902
	260.	.1863	3955.2	.03732	.2002	.00384	179.37	81.15	.22800	1.00056	.6879
	280.	.1730	4203.1	.03800	.2002	.00357	186.62	85.37	.25890	1.00052	.6863
	300.	.1615	4457.7	.03853	.2002	.00333	193.93	89.49	.29119	1.00049	.6852
	350.	.1384	5126.2	.03930	.2002	.00286	212.54	99.41	.37771	1.00042	.6845
	400.	.1211	5824.8	.03961	.2002	.00250	231.42	108.87	.47270	1.00036	.6845
	450.	.1077	6543.5	.03968	.2002	.00222	250.27	117.95	.57585	1.00032	.6848
	500.	.0969	7267.6	.03969	.2002	.00200	268.85	126.71	.68756	1.00029	.6846
	550.	.0881	7998.7	.03966	.2001	.00182	287.11	135.18	.80715	1.00027	.6843
	600.	.0808	8735.2	.03959	.2001	.00167	305.04	143.41	.93443	1.00024	.6840
	700.	.0692	10229.5	.03937	.2001	.00143	340.18	159.23	1.21101	1.00021	.6837
	800.	.0606	11763.3	.03903	.2001	.00125	374.86	174.35	1.51557	1.00018	.6835
	900.	.0539	13347.3	.03857	.2001	.00111	409.60	188.89	1.84698	1.00016	.6836
	1000.	.0485	14989.1	.03800	.2001	.00100	444.70	202.95	2.20426	1.00015	.6838
	1200.	.0404	18447.2	.03670	.2001	.00083	511.14	229.87	2.96406	1.00012	.6911
	1400.	.0346	22137.1	.03531	.2001	.00071	583.59	255.49	3.83808	1.00010	.6921
	1600.	.0303	26023.6	.03400	.2001	.00062	658.03	280.05	4.80793	1.00009	.6920
	1800.	.0269	30287.6	.03253	.2000	.00056	742.56	303.67	5.89970	1.00008	.6880
	2000.	.0242	35634.1	.03028	.1999	.00050	864.05	326.47	7.20329	1.00007	.6734
	2200.	.0220	43538.3	.02668	.1996	.00046	1078.45	345.09	8.90335	1.00007	.6344
	2400.	.0201	56550.8	.02183	.1989	.00042	1481.34	366.90	11.20481	1.00006	.5868
	2600.	.0184	78273.9	.01666	.1973	.00039	2206.80	388.97	14.15295	1.00006	.5378
	2800.	.0168	112868.7	.01225	.1944	.00037	3409.29	411.99	17.58529	1.00005	.5012
	3000.	.0153	163878.2	.00902	.1894	.00035	5220.51	436.69	21.28967	1.00005	.4825

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.25 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.885	.01296	1.1781	.9261	-308.8	-305.6	4.972	4.69	6.38	1267.
	14.	.01298	1.1673	.9261	-308.1	-304.8	5.027	4.71	6.44	1264.
	15.	.01312	1.0565	.9158	-301.4	-298.2	5.487	4.91	6.96	1224.
	16.	.01327	.9896	.8975	-294.3	-291.0	5.951	5.11	7.40	1197.
	17.	.01344	.9257	.8824	-286.7	-283.3	6.414	5.29	7.87	1174.
	18.	.01362	.8653	.8678	-278.6	-275.2	6.879	5.46	8.37	1151.
	19.	.01381	.8002	.8526	-270.0	-266.6	7.345	5.61	8.90	1127.
	20.	.01402	.7373	.8354	-260.9	-257.4	7.815	5.74	9.46	1103.
	21.	.01426	.6713	.8163	-251.2	-247.6	8.292	5.85	10.09	1076.
	22.	.01452	.6051	.7946	-240.8	-237.2	8.776	5.95	10.79	1048.
	23.	.01482	.5340	.7690	-229.7	-226.0	9.275	6.03	11.62	1015.
*	23.751	.01507	.4836	.7464	-220.8	-217.0	9.659	6.08	12.29	989.
*	23.751	.32422	.0645	.0140	121.2	202.2	27.322	6.73	14.28	370.
	24.	.32992	.0663	.0137	123.3	205.8	27.471	6.69	14.05	373.
	25.	.35185	.0731	.0127	131.5	219.5	28.029	6.56	13.36	386.
	26.	.37292	.0795	.0119	139.3	232.6	28.543	6.49	12.87	397.
	27.	.39336	.0856	.0112	146.9	245.2	29.022	6.44	12.52	408.
	28.	.41331	.0914	.0106	154.3	257.6	29.472	6.40	12.24	418.
	29.	.43286	.0971	.0100	161.5	269.7	29.898	6.38	12.02	428.
	30.	.45210	.1026	.0096	168.7	281.7	30.302	6.36	11.84	437.
	31.	.47106	.1079	.0092	175.7	293.4	30.688	6.34	11.69	446.
	32.	.48980	.1131	.0088	182.6	305.1	31.057	6.33	11.57	455.
	33.	.50834	.1183	.0084	189.5	316.6	31.412	6.32	11.46	463.
	34.	.52671	.1233	.0081	196.3	328.0	31.752	6.30	11.36	471.
	36.	.56303	.1332	.0076	209.8	350.6	32.397	6.28	11.21	487.
	38.	.59889	.1429	.0071	223.1	372.8	33.000	6.27	11.09	502.
	40.	.63439	.1523	.0067	236.3	394.9	33.566	6.27	10.99	517.
	42.	.66959	.1617	.0063	249.4	416.8	34.100	6.26	10.92	531.
	44.	.70454	.1709	.0060	262.5	438.6	34.607	6.27	10.86	544.
	46.	.73928	.1800	.0057	275.5	460.3	35.089	6.27	10.82	557.
	48.	.77385	.1890	.0054	288.4	481.9	35.549	6.29	10.79	570.
	50.	.80827	.1980	.0052	301.4	503.5	35.989	6.31	10.78	582.
	52.	.84256	.2069	.0050	314.4	525.0	36.412	6.33	10.77	593.
	56.	.91082	.2245	.0046	340.4	568.1	37.210	6.41	10.79	615.
	60.	.97873	.2419	.0043	366.8	611.4	37.957	6.51	10.86	635.
	65.	1.06323	.2636	.0039	400.3	666.1	38.832	6.70	11.01	658.
	70.	1.14741	.2850	.0036	434.8	721.7	39.656	6.95	11.23	679.
	75.	1.23134	.3064	.0034	470.7	778.5	40.440	7.25	11.51	697.
	80.	1.31507	.3276	.0032	508.1	836.9	41.194	7.61	11.85	714.
	90.	1.48207	.3699	.0028	588.7	959.2	42.633	8.41	12.63	745.
	100.	1.64864	.4119	.0025	677.5	1089.7	44.007	9.28	13.47	773.
	110.	1.81487	.4538	.0023	774.8	1228.5	45.327	10.11	14.29	801.
	120.	1.98088	.4955	.0021	879.8	1375.1	46.603	10.83	15.00	828.
	130.	2.14671	.5372	.0019	991.4	1528.1	47.827	11.41	15.57	856.
	140.	2.31241	.5788	.0018	1107.8	1685.9	48.996	11.82	15.98	884.
	160.	2.64350	.6618	.0016	1349.3	2010.2	51.161	12.21	16.36	942.
	180.	2.97431	.7448	.0014	1594.1	2337.7	53.090	12.19	16.33	999.
	200.	3.30493	.8276	.0013	1835.8	2662.1	54.798	11.95	16.09	1056.
	220.	3.63540	.9103	.0011	2071.8	2980.6	56.317	11.63	15.77	1111.
	240.	3.96578	.9930	.0010	2301.4	3292.9	57.675	11.33	15.46	1164.
	260.	4.29608	1.0757	.0010	2525.5	3599.5	58.903	11.07	15.21	1215.
	280.	4.62632	1.1583	.0009	2744.9	3901.5	60.022	10.87	15.00	1264.
	300.	4.95618	1.2408	.0008	2960.9	4200.0	61.052	10.72	14.85	1311.
	350.	5.78144	1.4473	.0007	3491.0	4936.4	63.321	10.51	14.64	1420.
	400.	6.60656	1.6536	.0006	4014.1	5665.8	65.271	10.43	14.55	1519.
	450.	7.43160	1.8599	.0006	4534.4	6392.3	66.983	10.41	14.53	1612.
	500.	8.25658	2.0662	.0005	5054.8	7119.0	68.513	10.40	14.53	1699.
	550.	9.08153	2.2725	.0005	5574.8	7845.2	69.897	10.41	14.53	1781.
	600.	9.90646	2.4787	.0004	6095.8	8572.4	71.162	10.42	14.55	1860.
	700.	11.55625	2.8912	.0004	7140.8	10029.9	73.409	10.48	14.61	2007.
	800.	13.20601	3.3037	.0003	8193.3	11494.8	75.364	10.57	14.70	2143.
	900.	14.85574	3.7161	.0003	9256.6	12970.6	77.101	10.70	14.82	2269.
	1000.	16.50545	4.1286	.0003	10333.9	14460.2	78.673	10.86	14.98	2387.
	1200.	19.80485	4.9534	.0002	12544.1	17495.3	81.427	11.24	15.37	2602.
	1400.	23.10426	5.7783	.0002	14837.0	20613.0	83.833	11.68	15.81	2796.
	1600.	26.40404	6.6031	.0002	17218.3	23819.3	85.951	12.13	16.26	2975.
	1800.	29.70632	7.4280	.0001	19700.8	27127.4	87.861	12.66	16.80	3139.
	2000.	33.01935	8.2528	.0001	22329.8	30584.7	89.748	13.55	17.73	3287.
	2200.	36.36665	9.0776	.0001	25212.4	34304.0	92.191	15.24	19.56	3413.
	2400.	39.80132	9.9025	.0001	28590.0	38540.3	95.079	18.42	23.05	3519.
	2600.	43.42403	10.7273	.0001	32864.2	43720.2	98.452	23.90	29.18	3617.
	2800.	47.40161	11.5522	.0001	38627.0	50477.4	102.348	32.49	39.02	3721.
	3000.	51.98234	12.3770	.0001	46661.3	59656.9	106.810	44.80	53.57	3842.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.25 MPA ISOBAR

	TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
*	13.885	77.1545	626.5	.25619	90.8919	.01019	73.63	256.32	.00054	1.25206	2.2222
	14.	77.0506	625.7	.25517	89.9438	.01030	74.79	252.05	.00054	1.25170	2.1711
	15.	76.2363	612.3	.24452	80.5409	.01137	83.33	221.85	.00057	1.24883	1.8534
	16.	75.3451	615.0	.23317	74.5620	.01204	89.24	197.46	.00058	1.24571	1.6381
	17.	74.4107	614.8	.22406	68.8847	.01281	93.14	177.80	.00057	1.24243	1.5032
	18.	73.4314	612.5	.21646	63.5428	.01366	95.90	161.61	.00056	1.23901	1.4097
	19.	72.4005	604.9	.20995	57.9339	.01472	97.49	148.01	.00054	1.23541	1.3514
	20.	71.3054	595.5	.20413	52.5755	.01589	98.89	136.31	.00053	1.23159	1.3044
	21.	70.1314	582.0	.19889	47.0814	.01734	100.49	126.05	.00051	1.22751	1.2657
	22.	68.8698	565.8	.19399	41.6725	.01907	101.30	116.92	.00049	1.22313	1.2451
	23.	67.4908	544.5	.18907	36.0382	.02134	101.38	108.58	.00047	1.21836	1.2443
*	23.751	66.3708	528.4	.18510	32.0971	.02325	100.99	102.75	.00045	1.21449	1.2500
*	23.751	3.7843	203.3	.06730	.1988	.07022	21.44	13.56	.00175	1.00932	.9028
	24.	3.0310	206.5	.06747	.2009	.06806	21.53	13.68	.00182	1.00916	.8928
	25.	2.8422	219.1	.06792	.2078	.06097	21.98	14.16	.00208	1.00859	.8607
	26.	2.6816	231.6	.06813	.2132	.05558	22.51	14.64	.00235	1.00810	.8374
	27.	2.5422	244.1	.06820	.2176	.05129	23.09	15.12	.00261	1.00768	.8195
	28.	2.4195	256.3	.06821	.2212	.04776	23.71	15.60	.00288	1.00731	.8051
	29.	2.3102	268.5	.06818	.2243	.04478	24.35	16.07	.00316	1.00698	.7934
	30.	2.2119	280.4	.06813	.2268	.04223	25.01	16.54	.00344	1.00668	.7834
	31.	2.1229	292.3	.06808	.2290	.04000	25.66	17.01	.00372	1.00641	.7752
	32.	2.0417	304.0	.06803	.2310	.03804	26.31	17.47	.00401	1.00616	.7681
	33.	1.9672	315.6	.06797	.2326	.03630	26.96	17.93	.00431	1.00594	.7620
	34.	1.8986	327.1	.06795	.2341	.03473	27.62	18.39	.00461	1.00573	.7563
	36.	1.7761	349.8	.06789	.2366	.03203	28.95	19.29	.00524	1.00536	.7466
	38.	1.6697	372.3	.06780	.2385	.02978	30.29	20.17	.00589	1.00504	.7383
	40.	1.5763	394.7	.06770	.2401	.02785	31.64	21.04	.00657	1.00476	.7311
	42.	1.4935	417.0	.06758	.2415	.02618	32.98	21.90	.00728	1.00451	.7250
	44.	1.4194	439.4	.06743	.2426	.02473	34.33	22.74	.00802	1.00428	.7195
	46.	1.3527	461.8	.06724	.2435	.02344	35.69	23.56	.00878	1.00408	.7146
	48.	1.2922	484.3	.06700	.2443	.02228	37.04	24.38	.00956	1.00390	.7102
	50.	1.2372	507.1	.06672	.2450	.02125	38.41	25.18	.01037	1.00373	.7064
	52.	1.1869	530.2	.06637	.2455	.02031	39.77	25.97	.01120	1.00358	.7032
	56.	1.0979	577.8	.06547	.2465	.01868	42.51	27.51	.01291	1.00331	.6985
	60.	1.0217	627.7	.06428	.2472	.01731	45.32	29.01	.01470	1.00308	.6954
	65.	.9405	694.3	.06238	.2479	.01586	49.14	30.83	.01708	1.00284	.6909
	70.	.8715	766.7	.06008	.2484	.01465	52.97	32.59	.01948	1.00263	.6911
	75.	.8121	845.6	.05751	.2488	.01361	56.76	34.31	.02186	1.00245	.6958
	80.	.7604	931.3	.05480	.2491	.01272	60.64	35.98	.02424	1.00229	.7028
	90.	.6747	1122.3	.04946	.2496	.01125	70.52	39.19	.02980	1.00203	.7017
	100.	.6066	1335.0	.04481	.2498	.01009	80.40	42.26	.03542	1.00183	.7082
	110.	.5510	1561.2	.04109	.2500	.00915	92.33	44.77	.04222	1.00166	.6930
	120.	.5048	1791.2	.03832	.2502	.00838	102.95	47.61	.04894	1.00152	.6937
	130.	.4658	2016.3	.03637	.2502	.00772	112.98	50.35	.05608	1.00140	.6938
	140.	.4324	2230.9	.03507	.2503	.00716	121.92	53.02	.06352	1.00130	.6949
	160.	.3783	2614.1	.03392	.2504	.00626	136.47	58.16	.07938	1.00114	.6973
	180.	.3362	2937.7	.03397	.2504	.00556	147.63	63.08	.09679	1.00101	.6978
	200.	.3026	3216.8	.03464	.2504	.00500	156.71	67.81	.11591	1.00091	.6961
	220.	.2751	3470.0	.03556	.2504	.00454	164.68	72.39	.13667	1.00083	.6932
	240.	.2522	3713.0	.03650	.2504	.00416	172.13	76.84	.15892	1.00076	.6903
	260.	.2328	3956.2	.03733	.2504	.00384	179.39	81.16	.18245	1.00070	.6880
	280.	.2162	4204.2	.03802	.2504	.00357	186.63	85.37	.20717	1.00065	.6863
	300.	.2018	4458.8	.03855	.2504	.00333	193.94	89.49	.23301	1.00061	.6852
	350.	.1730	5127.4	.03931	.2503	.00285	212.55	99.41	.30224	1.00052	.6845
	400.	.1514	5826.1	.03962	.2503	.00250	231.43	108.87	.37825	1.00046	.6846
	450.	.1346	6544.9	.03969	.2503	.00222	250.27	117.95	.46077	1.00041	.6849
	500.	.1211	7269.0	.03970	.2503	.00200	268.86	126.71	.55016	1.00036	.6846
	550.	.1101	8000.2	.03966	.2502	.00182	287.11	135.18	.64584	1.00033	.6843
	600.	.1009	8736.6	.03960	.2502	.00167	305.04	143.41	.74768	1.00030	.6840
	700.	.0865	10231.0	.03938	.2502	.00143	340.18	159.23	.96896	1.00026	.6837
	800.	.0757	11764.8	.03904	.2502	.00125	374.87	174.35	1.21262	1.00023	.6836
	900.	.0673	13348.9	.03857	.2501	.00111	409.61	188.83	1.47776	1.00020	.6836
	1000.	.0606	14990.6	.03800	.2501	.00100	444.70	202.95	1.76360	1.00018	.6838
	1200.	.0505	18448.8	.03670	.2501	.00083	511.14	229.87	2.37145	1.00015	.6911
	1400.	.0433	22138.0	.03532	.2501	.00071	583.56	255.49	3.07064	1.00013	.6921
	1600.	.0379	26017.7	.03401	.2501	.00062	657.72	280.05	3.84596	1.00011	.6922
	1800.	.0337	30244.2	.03259	.2500	.00056	740.80	303.67	4.71587	1.00010	.6886
	2000.	.0303	35450.3	.03047	.2499	.00050	856.83	326.47	5.74509	1.00009	.6755
	2200.	.0275	42955.2	.02711	.2496	.00046	1056.07	345.06	7.07022	1.00008	.6390
	2400.	.0251	55044.0	.02251	.2488	.00042	1424.01	366.82	8.85361	1.00008	.5937
	2600.	.0230	74959.4	.01747	.2470	.00039	2081.47	388.77	11.15244	1.00007	.5449
	2800.	.0211	106498.4	.01303	.2437	.00037	3169.47	411.54	13.86200	1.00006	.5066
	3000.	.0192	153046.9	.00967	.2381	.00035	4814.04	435.85	16.81836	1.00006	.4850

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.30 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.901	.01296	1.1812	.9267	-308.8	-304.9	4.973	4.69	6.38	1268.
14.	.01297	1.1750	.9266	-308.2	-304.3	5.020	4.71	6.43	1267.
15.	.01311	1.0616	.9176	-301.5	-297.6	5.480	4.91	6.96	1226.
16.	.01326	.9945	.8992	-294.4	-290.4	5.943	5.11	7.40	1200.
17.	.01343	.9305	.8840	-286.8	-282.8	6.406	5.29	7.86	1176.
18.	.01361	.8704	.8694	-278.8	-274.7	6.869	5.46	8.35	1154.
19.	.01380	.8051	.8542	-270.2	-266.1	7.335	5.61	8.89	1130.
20.	.01401	.7424	.8370	-261.1	-256.9	7.804	5.74	9.44	1105.
21.	.01424	.6765	.8180	-251.5	-247.2	8.279	5.85	10.06	1079.
22.	.01450	.6106	.7964	-241.1	-236.8	8.763	5.95	10.75	1051.
23.	.01480	.5414	.7710	-230.1	-225.6	9.259	6.02	11.55	1019.
24.	.01513	.4708	.7406	-218.2	-213.6	9.770	6.09	12.49	983.
* 24.571	.01535	.4345	.7207	-210.9	-206.3	10.071	6.12	13.04	962.
* 24.571	.27220	.0625	.0168	121.7	203.3	26.754	6.78	15.05	372.
25.	.28074	.0658	.0162	125.5	209.7	27.012	6.71	14.59	378.
26.	.29965	.0730	.0150	134.0	223.9	27.568	6.59	13.80	391.
27.	.31775	.0797	.0140	142.1	237.4	28.078	6.52	13.25	403.
28.	.33525	.0861	.0132	149.9	250.5	28.552	6.47	12.84	413.
29.	.35227	.0921	.0125	157.4	263.1	28.997	6.43	12.52	424.
30.	.36892	.0980	.0119	164.8	275.5	29.417	6.40	12.27	433.
31.	.38526	.1036	.0113	172.1	287.7	29.816	6.38	12.07	443.
32.	.40135	.1091	.0108	179.3	299.7	30.196	6.36	11.89	452.
33.	.41722	.1145	.0104	186.3	311.5	30.560	6.35	11.75	460.
34.	.43291	.1198	.0100	193.3	323.2	30.909	6.33	11.62	469.
36.	.46382	.1300	.0093	207.1	346.2	31.567	6.31	11.42	485.
38.	.49425	.1400	.0087	220.6	368.9	32.180	6.29	11.26	501.
40.	.52429	.1498	.0081	234.0	391.3	32.755	6.28	11.14	515.
42.	.55403	.1593	.0077	247.3	413.5	33.296	6.28	11.05	530.
44.	.58350	.1688	.0073	260.4	435.5	33.809	6.28	10.98	543.
46.	.61277	.1781	.0069	273.6	457.4	34.295	6.28	10.92	556.
48.	.64185	.1873	.0066	286.6	479.2	34.759	6.30	10.88	569.
50.	.67078	.1964	.0063	299.7	500.9	35.203	6.31	10.86	581.
52.	.69958	.2054	.0060	312.8	522.6	35.629	6.34	10.84	593.
56.	.75685	.2232	.0056	339.0	566.0	36.433	6.41	10.86	615.
60.	.81376	.2409	.0052	365.4	609.6	37.183	6.52	10.91	635.
65.	.88453	.2627	.0047	399.1	664.5	38.062	6.71	11.06	658.
70.	.95496	.2843	.0044	433.7	720.2	38.889	6.95	11.27	679.
75.	1.02514	.3058	.0041	469.7	777.2	39.675	7.26	11.54	697.
80.	1.09512	.3272	.0038	507.2	835.8	40.430	7.61	11.87	715.
90.	1.23463	.3696	.0034	587.9	958.2	41.872	8.41	12.65	745.
100.	1.37369	.4118	.0030	676.8	1088.9	43.248	9.28	13.49	774.
110.	1.51243	.4538	.0027	774.2	1227.9	44.570	10.11	14.30	801.
120.	1.65094	.4956	.0025	879.3	1374.6	45.846	10.83	15.01	829.
130.	1.78927	.5374	.0023	990.9	1527.6	47.071	11.41	15.58	857.
140.	1.92747	.5791	.0022	1107.4	1685.6	48.241	11.82	15.99	885.
160.	2.20356	.6622	.0019	1349.0	2010.0	50.407	12.21	16.37	942.
180.	2.47938	.7452	.0017	1593.8	2337.6	52.336	12.19	16.34	999.
200.	2.75500	.8281	.0015	1835.5	2662.0	54.045	11.95	16.09	1056.
220.	3.03048	.9109	.0014	2071.5	2980.7	55.564	11.63	15.77	1111.
240.	3.30587	.9937	.0013	2301.2	3293.0	56.922	11.33	15.47	1165.
260.	3.58117	1.0763	.0012	2525.3	3599.6	58.150	11.07	15.21	1216.
280.	3.85642	1.1590	.0011	2744.8	3901.7	59.269	10.87	15.01	1265.
300.	4.13135	1.2416	.0010	2960.8	4200.2	60.299	10.72	14.85	1311.
350.	4.81913	1.4480	.0009	3490.9	4936.6	62.569	10.51	14.64	1420.
400.	5.50678	1.6544	.0008	4014.0	5666.1	64.518	10.43	14.55	1520.
450.	6.19435	1.8607	.0007	4534.4	6392.7	66.231	10.41	14.53	1612.
500.	6.88186	2.0670	.0006	5054.8	7119.3	67.761	10.40	14.53	1699.
550.	7.56934	2.2733	.0005	5574.8	7845.6	69.145	10.41	14.53	1782.
600.	8.25679	2.4796	.0005	6095.8	8572.8	70.410	10.43	14.55	1860.
700.	9.63164	2.8921	.0004	7140.8	10030.2	72.657	10.48	14.61	2008.
800.	11.00645	3.3045	.0004	8193.3	11495.2	74.612	10.57	14.70	2143.
900.	12.38124	3.7170	.0003	9256.6	12971.0	76.349	10.70	14.82	2269.
1000.	13.75601	4.1294	.0003	10333.8	14460.6	77.921	10.86	14.98	2387.
1200.	16.50551	4.9543	.0003	12544.1	17495.7	80.675	11.24	15.37	2602.
1400.	19.25502	5.7792	.0002	14836.9	20613.4	83.081	11.58	15.81	2796.
1600.	22.00482	6.6040	.0002	17217.9	23819.4	85.199	12.13	16.25	2975.
1800.	24.75651	7.4289	.0002	19698.7	27125.6	87.108	12.64	16.78	3140.
2000.	27.51638	8.2537	.0002	22320.1	30575.0	88.990	13.48	17.66	3288.
2200.	30.30232	9.0785	.0001	25178.6	34269.3	91.422	15.06	19.36	3416.
2400.	33.15472	9.9034	.0001	28494.6	38441.0	94.281	17.99	22.57	3524.
2600.	36.15020	10.7282	.0001	32634.2	43479.2	97.599	23.02	28.19	3623.
2800.	39.41569	11.5531	.0001	38137.7	49962.4	101.393	30.90	37.20	3726.
3000.	43.14034	12.3779	.0001	45720.7	58662.8	105.690	42.21	50.52	3844.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.30 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	13.901	77.1830	628.1	.25612	91.1717	.01016	73.84	256.63	.00054	1.25216	2.2189
	14.	77.0933	628.6	.25525	90.5832	.01023	74.83	252.95	.00054	1.25185	2.1737
	15.	76.2817	613.9	.24492	80.9809	.01133	83.39	222.62	.00057	1.24899	1.8570
	16.	75.3938	616.7	.23354	74.9777	.01199	89.32	198.14	.00058	1.24588	1.6405
	17.	74.4636	616.5	.22441	69.2910	.01276	93.24	178.41	.00057	1.24262	1.5049
	18.	73.4888	614.4	.21680	63.9613	.01359	96.02	162.17	.00056	1.23921	1.4107
	19.	72.4621	606.9	.21028	58.3382	.01464	97.62	148.52	.00055	1.23562	1.3519
	20.	71.3718	597.7	.20443	52.9831	.01580	99.03	136.79	.00053	1.23182	1.3042
	21.	70.2051	584.3	.19917	47.4947	.01722	100.66	126.51	.00051	1.22776	1.2649
	22.	68.9515	568.4	.19426	42.1036	.01892	101.50	117.36	.00049	1.22341	1.2434
	23.	67.5828	548.3	.18937	36.5865	.02107	101.60	109.02	.00047	1.21868	1.2398
	24.	66.0882	524.8	.18403	31.1119	.02380	101.03	101.33	.00044	1.21352	1.2529
*	24.571	65.1597	512.3	.18067	28.3147	.02545	100.39	97.14	.00043	1.21032	1.2616
*	24.571	3.6738	205.1	.06760	.2296	.07336	22.71	14.13	.00148	1.01111	.9363
	25.	3.5621	210.8	.06787	.2344	.06921	22.83	14.33	.00158	1.01077	.9161
	26.	3.3372	224.0	.06825	.2437	.06162	23.20	14.80	.00181	1.01009	.8801
	27.	3.1471	236.9	.06842	.2509	.05592	23.69	15.27	.00205	1.00951	.8537
	28.	2.9829	249.7	.06846	.2568	.05142	24.23	15.74	.00228	1.00902	.8336
	29.	2.8387	262.2	.06844	.2616	.04775	24.81	16.20	.00251	1.00858	.8177
	30.	2.7106	274.6	.06840	.2656	.04469	25.42	16.67	.00275	1.00819	.8045
	31.	2.5956	286.8	.06834	.2690	.04207	26.05	17.13	.00299	1.00784	.7934
	32.	2.4916	298.8	.06828	.2719	.03980	26.68	17.59	.00324	1.00753	.7840
	33.	2.3968	310.7	.06822	.2745	.03781	27.31	18.04	.00349	1.00724	.7760
	34.	2.3100	322.4	.06820	.2767	.03604	27.96	18.49	.00375	1.00698	.7687
	36.	2.1560	345.5	.06814	.2804	.03304	29.26	19.39	.00428	1.00651	.7564
	38.	2.0233	368.4	.06805	.2833	.03057	30.58	20.26	.00483	1.00611	.7465
	40.	1.9073	391.1	.06794	.2857	.02849	31.91	21.13	.00540	1.00576	.7380
	42.	1.8050	413.8	.06781	.2876	.02671	33.23	21.98	.00600	1.00545	.7308
	44.	1.7138	436.3	.06764	.2892	.02516	34.57	22.81	.00661	1.00517	.7245
	46.	1.6319	459.0	.06744	.2906	.02380	35.91	23.64	.00725	1.00493	.7190
	48.	1.5580	481.7	.06720	.2917	.02259	37.26	24.45	.00791	1.00470	.7141
	50.	1.4908	504.7	.06690	.2927	.02151	38.62	25.25	.00859	1.00450	.7098
	52.	1.4294	528.0	.06655	.2936	.02054	39.97	26.03	.00928	1.00431	.7063
	56.	1.3213	575.8	.06563	.2949	.01885	42.69	27.57	.01072	1.00399	.7010
	60.	1.2289	625.9	.06443	.2960	.01744	45.49	29.07	.01221	1.00371	.6974
	65.	1.1305	692.7	.06251	.2970	.01596	49.30	30.88	.01420	1.00341	.6925
	70.	1.0472	765.3	.06020	.2977	.01472	53.12	32.64	.01621	1.00316	.6924
	75.	.9755	844.3	.05761	.2983	.01367	56.90	34.36	.01819	1.00294	.6969
	80.	.9131	930.1	.05489	.2987	.01276	60.77	36.02	.02018	1.00275	.7037
	90.	.8100	1121.2	.04954	.2994	.01128	70.64	39.23	.02483	1.00244	.7023
	100.	.7280	1334.1	.04487	.2998	.01011	80.51	42.30	.02952	1.00219	.7086
	110.	.6612	1560.5	.04114	.3000	.00916	92.37	44.78	.03517	1.00199	.6934
	120.	.6057	1790.7	.03836	.3002	.00838	102.99	47.62	.04077	1.00183	.6941
	130.	.5589	2016.0	.03640	.3003	.00773	113.02	50.36	.04673	1.00168	.6941
	140.	.5188	2230.7	.03510	.3004	.00717	121.95	53.03	.05293	1.00156	.6951
	160.	.4538	2614.2	.03395	.3005	.00626	136.50	58.16	.06616	1.00137	.6974
	180.	.4033	2938.1	.03399	.3006	.00556	147.65	63.08	.08068	1.00122	.6979
	200.	.3630	3217.4	.03466	.3006	.00500	156.73	67.82	.09661	1.00109	.6962
	220.	.3300	3470.8	.03558	.3006	.00454	164.70	72.40	.11392	1.00099	.6933
	240.	.3025	3713.9	.03652	.3006	.00416	172.14	76.84	.13246	1.00091	.6903
	260.	.2792	3957.2	.03735	.3006	.00384	179.40	81.16	.15208	1.00084	.6880
	280.	.2593	4205.2	.03803	.3005	.00357	186.65	85.37	.17269	1.00078	.6864
	300.	.2421	4459.9	.03856	.3005	.00333	193.95	89.49	.19423	1.00073	.6853
	350.	.2075	5128.6	.03933	.3005	.00285	212.56	99.41	.25193	1.00063	.6846
	400.	.1816	5827.4	.03963	.3004	.00250	231.44	108.87	.31528	1.00055	.6846
	450.	.1614	6546.3	.03970	.3004	.00222	250.28	117.95	.38406	1.00049	.6849
	500.	.1453	7270.4	.03971	.3004	.00200	268.86	126.71	.45855	1.00044	.6846
	550.	.1321	8001.6	.03967	.3003	.00182	287.12	135.18	.53830	1.00040	.6843
	600.	.1211	8738.1	.03961	.3003	.00167	305.05	143.41	.62317	1.00036	.6840
	700.	.1038	10232.4	.03939	.3003	.00143	340.18	159.23	.80759	1.00031	.6837
	800.	.0909	11766.3	.03904	.3002	.00125	374.87	174.35	1.01065	1.00027	.6836
	900.	.0808	13350.4	.03857	.3002	.00111	409.61	188.89	1.23162	1.00024	.6836
	1000.	.0727	14992.2	.03801	.3002	.00100	444.71	202.95	1.46983	1.00022	.6838
	1200.	.0606	18450.4	.03670	.3002	.00083	511.14	229.87	1.97638	1.00018	.6911
	1400.	.0519	22139.1	.03532	.3001	.00071	583.53	255.50	2.55903	1.00016	.6921
	1600.	.0454	26013.8	.03403	.3001	.00062	657.50	280.05	3.20478	1.00014	.6922
	1800.	.0404	30212.6	.03264	.3001	.00056	739.50	303.67	3.92755	1.00012	.6891
	2000.	.0363	35315.2	.03062	.3000	.00050	851.60	326.46	4.77675	1.00011	.6770
	2200.	.0330	42525.2	.02744	.2996	.00046	1039.54	345.05	5.85887	1.00010	.6425
	2400.	.0302	53931.1	.02304	.2987	.00042	1381.65	366.77	7.30689	1.00009	.5391
	2600.	.0277	72507.0	.01812	.2968	.00039	1988.70	388.61	9.18061	1.00008	.5509
	2800.	.0254	101769.2	.01367	.2931	.00037	2991.39	411.19	11.41016	1.00008	.5114
	3000.	.0232	144953.9	.01022	.2869	.00035	4510.27	435.21	13.86503	1.00007	.4875

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.35 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.918	.01295	1.1844	.9273	-308.8	-304.3	4.974	4.69	6.39	1270.
	14.	.01296	1.1826	.9272	-308.3	-303.7	5.014	4.71	6.42	1270.
	15.	.01310	1.0667	.9194	-301.6	-297.1	5.473	4.91	6.95	1229.
	16.	.01326	.9993	.9009	-294.5	-289.9	5.936	5.10	7.39	1203.
	17.	.01342	.9353	.8856	-287.0	-282.3	6.398	5.29	7.86	1179.
	18.	.01360	.8753	.8710	-278.9	-274.2	6.860	5.45	8.34	1157.
	19.	.01379	.8100	.8559	-270.4	-265.6	7.325	5.60	8.87	1132.
	20.	.01400	.7473	.8386	-261.3	-256.4	7.793	5.73	9.42	1108.
	21.	.01423	.6817	.8197	-251.7	-246.7	8.267	5.85	10.04	1082.
	22.	.01449	.6161	.7982	-241.4	-236.4	8.749	5.94	10.72	1054.
	23.	.01478	.5473	.7730	-230.4	-225.2	9.244	6.02	11.51	1023.
	24.	.01511	.4770	.7430	-218.6	-213.3	9.752	6.09	12.43	987.
	25.	.01549	.4056	.7075	-205.8	-200.4	10.280	6.14	13.55	946.
*	25.299	.01562	.3858	.6949	-201.7	-196.2	10.445	6.16	13.89	933.
*	25.299	.23414	.0603	.0198	121.6	203.6	26.258	6.84	15.88	374.
	26.	.24651	.0660	.0186	128.2	214.4	26.682	6.72	15.02	384.
	27.	.26317	.0735	.0172	136.9	229.0	27.231	6.61	14.16	397.
	28.	.27906	.0805	.0161	145.2	242.8	27.735	6.54	13.56	408.
	29.	.29438	.0870	.0151	153.1	256.2	28.202	6.49	13.11	419.
	30.	.30925	.0933	.0143	160.9	269.1	28.641	6.45	12.76	429.
	31.	.32378	.0993	.0136	168.4	281.7	29.054	6.42	12.48	439.
	32.	.33801	.1051	.0130	175.8	294.1	29.447	6.40	12.26	449.
	33.	.35201	.1107	.0124	183.0	306.3	29.821	6.38	12.07	458.
	34.	.36580	.1162	.0119	190.2	318.2	30.179	6.36	11.90	466.
	36.	.39289	.1269	.0110	204.3	341.8	30.852	6.33	11.64	483.
	38.	.41946	.1372	.0103	218.0	364.8	31.476	6.31	11.45	499.
	40.	.44562	.1472	.0096	231.6	387.6	32.059	6.30	11.30	514.
	42.	.47146	.1570	.0091	245.1	410.1	32.608	6.29	11.19	528.
	44.	.49704	.1666	.0086	258.4	432.4	33.126	6.29	11.10	542.
	46.	.52239	.1761	.0082	271.6	454.5	33.618	6.29	11.03	556.
	48.	.54756	.1855	.0078	284.8	476.5	34.086	6.30	10.98	568.
	50.	.57257	.1947	.0074	298.0	498.4	34.533	6.32	10.94	581.
	52.	.59745	.2039	.0071	311.2	520.3	34.962	6.35	10.92	592.
	56.	.64688	.2220	.0065	337.5	563.9	35.771	6.42	10.92	614.
	60.	.69594	.2398	.0061	364.1	607.7	36.525	6.52	10.97	635.
	65.	.75689	.2618	.0056	397.9	662.8	37.408	6.71	11.10	658.
	70.	.81750	.2836	.0051	432.7	718.8	38.237	6.96	11.30	679.
	75.	.87786	.3052	.0048	468.7	775.9	39.026	7.26	11.57	698.
	80.	.93802	.3267	.0045	506.3	834.6	39.783	7.61	11.90	715.
	90.	1.05788	.3694	.0039	587.1	957.3	41.227	8.42	12.67	746.
	100.	1.17730	.4117	.0035	676.1	1088.1	42.605	9.28	13.50	774.
	110.	1.29640	.4538	.0032	773.5	1227.3	43.928	10.11	14.31	802.
	120.	1.41526	.4958	.0029	879.7	1374.1	45.205	10.83	15.02	829.
	130.	1.53396	.5376	.0027	990.4	1527.2	46.431	11.41	15.59	857.
	140.	1.65251	.5794	.0025	1106.9	1685.3	47.602	11.82	15.99	885.
	160.	1.88933	.6626	.0022	1348.6	2009.8	49.768	12.21	16.37	942.
	180.	2.12586	.7457	.0020	1593.4	2337.5	51.699	12.19	16.34	1000.
	200.	2.36220	.8287	.0018	1835.3	2662.0	53.407	11.95	16.09	1056.
	220.	2.59840	.9115	.0016	2071.3	2980.7	54.927	11.63	15.77	1112.
	240.	2.83450	.9943	.0015	2301.0	3293.1	56.285	11.33	15.47	1165.
	260.	3.07053	1.0770	.0013	2525.1	3599.8	57.513	11.08	15.21	1216.
	280.	3.30649	1.1597	.0013	2744.6	3901.9	58.633	10.87	15.01	1265.
	300.	3.54219	1.2423	.0012	2960.6	4200.4	59.663	10.72	14.85	1312.
	350.	4.13177	1.4488	.0010	3490.8	4936.9	61.933	10.51	14.64	1421.
	400.	4.72123	1.6552	.0009	4013.9	5666.4	63.882	10.43	14.55	1520.
	450.	5.31060	1.8615	.0008	4534.3	6393.0	65.595	10.41	14.53	1612.
	500.	5.89992	2.0679	.0007	5054.7	7119.7	67.125	10.40	14.53	1699.
	550.	6.48920	2.2742	.0006	5574.7	7845.9	68.510	10.41	14.53	1782.
	600.	7.07846	2.4804	.0006	6095.7	8573.2	69.774	10.43	14.55	1861.
	700.	8.25692	2.8929	.0005	7140.7	10030.6	72.022	10.48	14.61	2008.
	800.	9.43534	3.3054	.0004	8193.2	11495.6	73.976	10.57	14.70	2144.
	900.	10.61374	3.7179	.0004	9256.6	12971.4	75.713	10.70	14.82	2270.
	1000.	11.79212	4.1303	.0004	10333.8	14461.1	77.285	10.86	14.98	2387.
	1200.	14.14885	4.9552	.0003	12544.1	17496.2	80.039	11.24	15.37	2602.
	1400.	16.50557	5.7801	.0003	14836.9	20613.8	82.446	11.68	15.81	2797.
	1600.	18.86252	6.6049	.0002	17217.7	23819.6	84.563	12.12	16.25	2975.
	1800.	21.22097	7.4298	.0002	19697.0	27124.3	86.471	12.63	16.77	3141.
	2000.	23.58592	8.2546	.0002	22312.5	30567.5	88.350	13.43	17.61	3289.
	2200.	25.97155	9.0794	.0002	25152.3	34242.3	90.773	14.92	19.20	3419.
	2400.	28.40994	9.9043	.0001	28420.4	38363.9	93.611	17.65	22.20	3529.
	2600.	30.96186	10.7291	.0001	32455.4	43292.1	96.884	22.34	27.43	3628.
	2800.	33.72810	11.5540	.0001	37757.3	49562.2	100.600	29.56	35.79	3731.
	3000.	36.85890	12.3788	.0001	44989.2	57889.9	104.769	40.19	48.15	3846.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.35 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)/V_P$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	13.918	77.2115	629.7	.25606	91.4518	.01014	74.05	256.94	.00054	1.25226	2.2156
	14.	77.1358	631.5	.25533	91.2209	.01016	74.87	253.85	.00054	1.25200	2.1762
	15.	76.3270	615.5	.24531	81.4195	.01129	83.45	223.39	.00057	1.24915	1.8636
	16.	75.4422	618.3	.23391	75.3921	.01195	89.40	198.82	.00058	1.24605	1.6430
	17.	74.5163	618.2	.22476	69.6955	.01271	93.34	179.02	.00057	1.24280	1.5066
	18.	73.5458	616.3	.21712	64.3776	.01353	96.13	162.73	.00056	1.23941	1.4117
	19.	72.5233	608.8	.21059	58.7405	.01457	97.75	149.03	.00055	1.23583	1.3524
	20.	71.4378	599.8	.20472	53.3890	.01571	99.18	137.27	.00053	1.23205	1.3041
	21.	70.2782	586.7	.19946	47.9054	.01711	100.82	126.97	.00051	1.22802	1.2641
	22.	69.0324	571.1	.19454	42.5317	.01877	101.69	117.81	.00049	1.22369	1.2417
	23.	67.6752	551.3	.18966	37.0390	.02087	101.82	109.47	.00047	1.21899	1.2370
	24.	66.1935	528.1	.18438	31.5729	.02353	101.28	101.78	.00044	1.21388	1.2489
	25.	64.5558	501.3	.17842	26.1849	.02702	100.08	94.56	.00041	1.20824	1.2799
*	25.299	64.0123	493.5	.17627	24.6963	.02814	99.54	92.41	.00040	1.20637	1.2891
*	25.299	4.2710	206.2	.06790	.2575	.07699	23.94	14.66	.00127	1.01293	.9724
	26.	4.0566	216.0	.06830	.2678	.06953	24.06	14.98	.00142	1.01228	.9349
	27.	3.7998	229.6	.06858	.2793	.06168	24.39	15.43	.00163	1.01150	.8958
	28.	3.5834	242.9	.06868	.2883	.05581	24.83	15.88	.00184	1.01084	.8674
	29.	3.3970	255.9	.06869	.2956	.05122	25.33	16.34	.00205	1.01027	.8457
	30.	3.2336	268.7	.06865	.3016	.04749	25.88	16.80	.00226	1.00978	.8284
	31.	3.0885	281.3	.06859	.3066	.04438	26.47	17.25	.00247	1.00934	.8137
	32.	2.9585	293.6	.06853	.3108	.04174	27.08	17.70	.00269	1.00894	.8014
	33.	2.8408	305.8	.06846	.3145	.03945	27.69	18.15	.00291	1.00859	.7911
	34.	2.7337	317.7	.06845	.3177	.03745	28.31	18.60	.00313	1.00826	.7819
	36.	2.5452	341.3	.06840	.3229	.03411	29.58	19.49	.00359	1.00769	.7669
	38.	2.3840	364.5	.06830	.3270	.03141	30.87	20.36	.00407	1.00720	.7550
	40.	2.2441	387.6	.06818	.3303	.02916	32.18	21.22	.00457	1.00678	.7451
	42.	2.1211	410.5	.06804	.3330	.02725	33.49	22.06	.00508	1.00641	.7369
	44.	2.0119	433.3	.06786	.3353	.02561	34.82	22.89	.00561	1.00607	.7297
	46.	1.9143	456.2	.06765	.3372	.02417	36.15	23.71	.00616	1.00578	.7235
	48.	1.8263	479.2	.06740	.3387	.02291	37.48	24.52	.00673	1.00551	.7180
	50.	1.7465	502.3	.06709	.3401	.02178	38.83	25.31	.00732	1.00527	.7133
	52.	1.6738	525.7	.06673	.3413	.02077	40.17	26.10	.00791	1.00505	.7093
	56.	1.5459	573.8	.06580	.3431	.01902	42.88	27.63	.00915	1.00467	.7034
	60.	1.4369	624.1	.06458	.3446	.01757	45.67	29.12	.01043	1.00434	.6994
	65.	1.3212	691.2	.06265	.3459	.01606	49.47	30.94	.01214	1.00399	.6941
	70.	1.2232	763.9	.06032	.3469	.01480	53.27	32.69	.01387	1.00369	.6936
	75.	1.1391	843.0	.05772	.3477	.01373	57.03	34.40	.01558	1.00344	.6980
	80.	1.0661	928.9	.05499	.3483	.01281	60.90	36.06	.01728	1.00322	.7046
	90.	.9453	1120.2	.04962	.3492	.01131	70.75	39.27	.02127	1.00285	.7030
	100.	.8494	1333.2	.04494	.3497	.01013	80.62	42.33	.02530	1.00256	.7091
	110.	.7714	1559.8	.04119	.3501	.00918	92.42	44.79	.03013	1.00233	.6938
	120.	.7066	1790.2	.03840	.3503	.00839	103.03	47.62	.03494	1.00213	.6944
	130.	.6519	2015.7	.03644	.3505	.00773	113.06	50.37	.04006	1.00197	.6944
	140.	.6051	2230.5	.03514	.3506	.00717	121.99	53.03	.04537	1.00182	.6953
	160.	.5293	2614.4	.03397	.3507	.00626	136.53	58.17	.05671	1.00160	.6976
	180.	.4704	2938.5	.03402	.3508	.00556	147.67	63.09	.06917	1.00142	.6980
	200.	.4233	3218.0	.03468	.3508	.00500	156.75	67.82	.08283	1.00128	.6963
	220.	.3849	3471.6	.03560	.3508	.00454	164.71	72.40	.09767	1.00116	.6934
	240.	.3528	3714.8	.03654	.3508	.00416	172.16	76.84	.11357	1.00106	.6904
	260.	.3257	3958.2	.03737	.3508	.00384	179.41	81.16	.13039	1.00098	.6881
	280.	.3024	4206.3	.03805	.3507	.00357	186.66	85.38	.14806	1.00091	.6864
	300.	.2823	4461.1	.03858	.3507	.00333	193.96	89.49	.16652	1.00085	.6853
	350.	.2420	5129.9	.03934	.3506	.00285	212.57	99.41	.21599	1.00073	.6846
	400.	.2118	5828.8	.03964	.3506	.00250	231.45	108.87	.27030	1.00064	.6846
	450.	.1883	6547.6	.03971	.3505	.00222	250.29	117.95	.32927	1.00057	.6849
	500.	.1695	7271.8	.03972	.3505	.00200	268.87	126.71	.39312	1.00051	.6846
	550.	.1541	8003.0	.03968	.3505	.00182	287.12	135.18	.46148	1.00046	.6843
	600.	.1413	8739.6	.03961	.3504	.00166	305.05	143.41	.53424	1.00043	.6840
	700.	.1211	10233.9	.03939	.3504	.00143	340.19	159.23	.69232	1.00036	.6837
	800.	.1060	11767.8	.03905	.3503	.00125	374.87	174.35	.86639	1.00032	.6836
	900.	.0942	13352.0	.03858	.3503	.00111	409.61	188.89	1.05580	1.00028	.6836
	1000.	.0848	14993.8	.03801	.3503	.00100	444.71	202.95	1.25999	1.00026	.6838
	1200.	.0707	18452.0	.03671	.3502	.00083	511.14	229.87	1.69419	1.00021	.6911
	1400.	.0606	22140.4	.03532	.3502	.00071	583.52	255.50	2.19359	1.00018	.6921
	1600.	.0530	26011.1	.03404	.3502	.00062	657.33	280.05	2.74687	1.00016	.6923
	1800.	.0471	30188.4	.03267	.3501	.00056	738.48	303.67	3.36495	1.00014	.6894
	2000.	.0424	35210.5	.03073	.3500	.00050	847.49	326.46	4.08714	1.00013	.6782
	2200.	.0385	42191.3	.02770	.3496	.00046	1026.69	345.03	4.99955	1.00012	.6453
	2400.	.0352	53066.0	.02347	.3486	.00042	1348.70	366.72	6.21391	1.00011	.6036
	2600.	.0323	70597.7	.01866	.3465	.00039	1916.46	388.49	7.78899	1.00010	.5559
	2800.	.0296	98078.1	.01421	.3426	.00036	2852.37	410.92	9.67734	1.00009	.5156
	3000.	.0271	138607.2	.01070	.3358	.00035	4271.99	434.69	11.77275	1.00008	.4899

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.40 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
	13.935	.01295	1.1876	.9279	-308.8	-303.6	4.975	4.69	6.39	1271.
	14.	.01296	1.1902	.9278	-308.3	-303.2	5.007	4.71	6.41	1273.
	15.	.01309	1.0718	.9211	-301.8	-296.5	5.465	4.91	6.94	1231.
	16.	.01325	1.0042	.9025	-294.6	-289.3	5.928	5.10	7.38	1205.
	17.	.01341	.9401	.8872	-287.1	-281.7	6.389	5.29	7.85	1181.
	18.	.01358	.8826	.8729	-279.1	-273.7	6.850	5.45	8.32	1160.
	19.	.01378	.8191	.8576	-270.6	-265.1	7.314	5.60	8.84	1137.
	20.	.01399	.7523	.8402	-261.6	-256.0	7.782	5.73	9.40	1111.
	21.	.01421	.6868	.8213	-252.0	-246.3	8.255	5.84	10.01	1085.
	22.	.01447	.6215	.8000	-241.7	-235.9	8.736	5.94	10.68	1057.
	23.	.01476	.5532	.7751	-230.8	-224.9	9.228	6.02	11.46	1026.
	24.	.01508	.4831	.7454	-219.0	-213.0	9.734	6.09	12.37	991.
	25.	.01546	.4122	.7103	-206.3	-200.1	10.259	6.14	13.46	950.
*	25.957	.01590	.3437	.6694	-192.9	-186.6	10.790	6.19	14.74	905.
*	25.957	.20496	.0579	.0229	121.1	203.1	25.813	6.89	16.79	376.
	26.	.20572	.0583	.0228	121.6	203.9	25.842	6.88	16.71	376.
	27.	.22161	.0668	.0208	131.2	219.9	26.445	6.72	15.34	390.
	28.	.23648	.0745	.0193	140.1	234.7	26.985	6.62	14.44	403.
	29.	.25063	.0817	.0180	148.6	248.8	27.480	6.56	13.80	415.
	30.	.26426	.0884	.0170	156.7	262.4	27.940	6.51	13.33	425.
	31.	.27747	.0948	.0160	164.5	275.5	28.371	6.47	12.96	436.
	32.	.29036	.1009	.0153	172.2	288.3	28.777	6.44	12.66	445.
	33.	.30298	.1068	.0145	179.7	300.9	29.163	6.42	12.41	455.
	34.	.31537	.1126	.0139	187.0	313.2	29.531	6.39	12.21	464.
	36.	.33963	.1237	.0128	201.4	337.2	30.219	6.35	11.88	481.
	38.	.36332	.1343	.0119	215.4	360.8	30.855	6.33	11.65	497.
	40.	.38659	.1446	.0112	229.2	383.9	31.447	6.31	11.47	513.
	42.	.40952	.1547	.0105	242.8	406.7	32.003	6.30	11.33	527.
	44.	.43217	.1645	.0099	256.3	429.2	32.528	6.30	11.22	541.
	46.	.45460	.1742	.0094	269.7	451.5	33.024	6.30	11.14	555.
	48.	.47684	.1837	.0089	283.0	473.8	33.497	6.31	11.07	568.
	50.	.49892	.1931	.0085	296.3	495.8	33.948	6.33	11.03	580.
	52.	.52086	.2024	.0082	309.5	517.9	34.380	6.35	11.00	592.
	56.	.56440	.2207	.0075	336.0	561.8	35.194	6.42	10.98	614.
	60.	.60758	.2387	.0070	362.8	605.8	35.952	6.53	11.02	635.
	65.	.66116	.2610	.0064	396.7	661.1	36.839	6.71	11.14	658.
	70.	.71441	.2829	.0059	431.6	717.3	37.671	6.96	11.34	679.
	75.	.76741	.3047	.0055	467.7	774.6	38.462	7.26	11.60	698.
	80.	.82020	.3263	.0051	505.4	833.4	39.221	7.61	11.92	715.
	90.	.92533	.3691	.0045	586.2	956.4	40.668	8.42	12.59	746.
	100.	1.03002	.4116	.0041	675.4	1087.4	42.047	9.28	13.52	774.
	110.	1.13438	.4539	.0037	772.9	1226.7	43.372	10.11	14.33	802.
	120.	1.23851	.4959	.0034	878.2	1373.6	44.650	10.83	15.03	830.
	130.	1.34247	.5378	.0031	989.8	1526.8	45.877	11.41	15.59	857.
	140.	1.44630	.5796	.0029	1106.4	1685.0	47.048	11.82	16.00	886.
	160.	1.65365	.6630	.0025	1348.2	2009.6	49.215	12.22	16.38	943.
	180.	1.86072	.7462	.0022	1593.1	2337.4	51.146	12.19	16.34	1000.
	200.	2.06760	.8292	.0020	1835.0	2662.0	52.855	11.95	16.10	1057.
	220.	2.27434	.9121	.0018	2071.0	2980.8	54.375	11.63	15.78	1112.
	240.	2.48098	.9949	.0017	2300.8	3293.2	55.734	11.33	15.47	1165.
	260.	2.68754	1.0777	.0015	2524.9	3599.9	56.962	11.08	15.21	1217.
	280.	2.89405	1.1604	.0014	2744.4	3902.0	58.081	10.87	15.01	1266.
	300.	3.10031	1.2430	.0013	2960.5	4200.6	59.112	10.72	14.85	1312.
	350.	3.61625	1.4496	.0011	3490.7	4937.2	61.382	10.51	14.64	1421.
	400.	4.13206	1.6560	.0010	4013.8	5666.7	63.331	10.43	14.55	1520.
	450.	4.64779	1.8624	.0009	4534.2	6393.3	65.044	10.41	14.53	1613.
	500.	5.16346	2.0687	.0008	5054.6	7120.0	66.574	10.40	14.53	1700.
	550.	5.67910	2.2750	.0007	5574.7	7846.3	67.959	10.41	14.53	1782.
	600.	6.19471	2.4813	.0007	6095.7	8573.6	69.223	10.43	14.55	1861.
	700.	7.22588	2.8938	.0006	7140.7	10031.0	71.471	10.48	14.61	2008.
	800.	8.25701	3.3063	.0005	8193.2	11496.0	73.426	10.57	14.70	2144.
	900.	9.28811	3.7187	.0004	9256.6	12971.8	75.162	10.70	14.82	2270.
	1000.	10.31920	4.1312	.0004	10333.8	14461.5	76.734	10.86	14.98	2388.
	1200.	12.38135	4.9561	.0003	12544.1	17496.6	79.488	11.24	15.37	2603.
	1400.	14.44349	5.7809	.0003	14836.8	20614.2	81.895	11.68	15.81	2797.
	1600.	16.50580	6.6058	.0003	17217.5	23819.8	84.012	12.12	16.25	2976.
	1800.	18.56935	7.4306	.0002	19695.6	27123.4	85.919	12.62	16.75	3141.
	2000.	20.63822	8.2555	.0002	22306.3	30561.6	87.796	13.39	17.56	3290.
	2200.	22.72401	9.0803	.0002	25131.1	34220.7	90.211	14.80	19.08	3421.
	2400.	24.85299	9.9052	.0002	28360.6	38301.8	93.032	17.38	21.90	3532.
	2600.	27.07490	10.7300	.0002	32311.3	43141.3	96.270	21.78	26.81	3633.
	2800.	29.47226	11.5548	.0001	37450.7	49239.6	99.922	28.66	34.65	3734.
	3000.	32.16812	12.3797	.0001	44399.4	57266.7	103.987	38.56	46.24	3848.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.40 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.935	77.2399	631.3	.25599	91.7322	.01011	74.25	257.26	.00054	1.25236	2.2124
14.	77.1782	634.3	.25541	91.8568	.01010	74.91	254.75	.00055	1.25215	2.1789
15.	76.3720	617.1	.24570	81.8567	.01125	83.51	224.16	.00057	1.24931	1.8642
16.	75.4904	619.9	.23427	75.8051	.01191	89.48	199.49	.00058	1.24621	1.6455
17.	74.5686	619.9	.22511	70.0983	.01266	93.43	179.63	.00057	1.24298	1.5084
18.	73.6116	619.2	.21750	64.9667	.01344	96.26	163.38	.00057	1.23964	1.4120
19.	72.5911	612.8	.21094	59.4563	.01442	97.89	149.60	.00055	1.23607	1.3508
20.	71.5035	602.0	.20502	53.7931	.01562	99.33	137.75	.00053	1.23228	1.3040
21.	70.3507	589.0	.19974	48.3137	.01700	100.99	127.43	.00052	1.22827	1.2634
22.	69.1127	573.7	.19481	42.9569	.01862	101.88	118.25	.00050	1.22397	1.2401
23.	67.7665	554.3	.18995	37.4872	.02068	102.04	109.91	.00047	1.21931	1.2344
24.	66.2974	531.4	.18472	32.0293	.02327	101.53	102.22	.00045	1.21424	1.2450
25.	64.6759	505.0	.17883	26.6582	.02664	100.37	95.02	.00042	1.20865	1.2739
* 25.957	62.9088	476.2	.17182	21.6193	.03096	98.50	88.30	.00038	1.20259	1.3216
* 25.957	4.8790	206.9	.06820	.2826	.08113	25.16	15.16	.00111	1.01478	1.0116
26.	4.8610	207.6	.06823	.2835	.08050	25.15	15.18	.00111	1.01472	1.0083
27.	4.5124	222.0	.06869	.3016	.06910	25.23	15.61	.00131	1.01366	.9489
28.	4.2287	235.9	.06888	.3152	.06120	25.51	16.05	.00150	1.01280	.9083
29.	3.9899	249.5	.06892	.3258	.05532	25.91	16.49	.00169	1.01207	.8787
30.	3.7842	262.8	.06889	.3344	.05072	26.38	16.94	.00188	1.01145	.8557
31.	3.6040	275.7	.06883	.3415	.04699	26.93	17.38	.00208	1.01090	.8364
32.	3.4440	288.4	.06877	.3475	.04389	27.50	17.83	.00227	1.01042	.8207
33.	3.3005	301.0	.06869	.3526	.04125	28.09	18.27	.00247	1.00998	.8077
34.	3.1708	313.1	.06870	.3570	.03898	28.68	18.71	.00267	1.00959	.7963
36.	2.9444	337.0	.06866	.3641	.03525	29.91	19.59	.00308	1.00890	.7781
38.	2.7524	360.7	.06856	.3697	.03229	31.18	20.45	.00350	1.00832	.7640
40.	2.5867	384.1	.06843	.3741	.02986	32.47	21.31	.00394	1.00782	.7525
42.	2.4419	407.3	.06827	.3777	.02781	33.76	22.15	.00439	1.00738	.7431
44.	2.3139	430.4	.06809	.3807	.02607	35.07	22.97	.00486	1.00699	.7351
46.	2.1997	453.4	.06786	.3832	.02456	36.38	23.79	.00535	1.00664	.7281
48.	2.0971	476.6	.06760	.3853	.02323	37.71	24.59	.00585	1.00633	.7220
50.	2.0043	499.9	.06728	.3871	.02205	39.04	25.38	.00636	1.00605	.7169
52.	1.9199	523.5	.06691	.3886	.02100	40.38	26.16	.00689	1.00580	.7125
56.	1.7718	571.9	.06596	.3910	.01920	43.07	27.69	.00797	1.00535	.7059
60.	1.6459	622.4	.06473	.3929	.01770	45.84	29.18	.00910	1.00497	.7014
65.	1.5125	689.7	.06278	.3947	.01615	49.63	30.99	.01060	1.00456	.6956
70.	1.3998	762.5	.06044	.3960	.01487	53.43	32.74	.01212	1.00422	.6948
75.	1.3031	841.8	.05783	.3970	.01378	57.17	34.45	.01361	1.00393	.6991
80.	1.2192	927.7	.05509	.3978	.01285	61.02	36.11	.01511	1.00368	.7055
90.	1.0807	1119.2	.04970	.3989	.01133	70.87	39.31	.01861	1.00326	.7036
100.	.9709	1332.4	.04500	.3996	.01015	80.73	42.37	.02214	1.00293	.7095
110.	.8815	1559.2	.04124	.4001	.00919	92.47	44.80	.02636	1.00266	.6942
120.	.8074	1789.7	.03845	.4004	.00840	103.07	47.63	.03057	1.00243	.6947
130.	.7449	2015.3	.03648	.4006	.00774	113.09	50.37	.03505	1.00225	.6946
140.	.6914	2230.4	.03517	.4008	.00717	122.02	53.04	.03970	1.00208	.6955
160.	.6047	2614.5	.03400	.4010	.00626	136.55	58.18	.04963	1.00182	.6978
180.	.5374	2938.9	.03404	.4010	.00556	147.70	63.09	.06053	1.00162	.6982
200.	.4837	3218.6	.03471	.4010	.00500	156.77	67.[illegible]	.07250	1.00146	.6964
220.	.4397	3472.3	.03562	.4010	.00454	164.73	72.4[illegible]	.08549	1.00133	.6934
240.	.4031	3715.7	.03656	.4010	.00416	172.17	76.84	.09940	1.00121	.6905
260.	.3721	3959.2	.03739	.4010	.00384	179.43	81.17	.11412	1.00112	.6881
280.	.3455	4207.3	.03807	.4010	.00357	186.67	85.38	.12958	1.00104	.6865
300.	.3225	4462.2	.03859	.4009	.00333	193.97	89.50	.14575	1.00097	.6854
350.	.2765	5131.1	.03935	.4008	.00285	212.57	99.41	.18904	1.00083	.6846
400.	.2420	5830.1	.03965	.4008	.00250	231.46	108.88	.23657	1.00073	.6846
450.	.2152	6549.0	.03972	.4007	.00222	250.29	117.96	.28817	1.00065	.6849
500.	.1937	7273.2	.03973	.4006	.00200	268.88	126.71	.34405	1.00058	.6846
550.	.1761	8004.5	.03969	.4006	.00182	287.13	135.19	.40387	1.00053	.6843
600.	.1614	8741.0	.03962	.4005	.00166	305.06	143.41	.46754	1.00049	.6841
700.	.1384	10235.4	.03940	.4005	.00143	340.19	159.23	.60587	1.00042	.6837
800.	.1211	11769.3	.03905	.4004	.00125	374.88	174.35	.75819	1.00036	.6836
900.	.1077	13353.5	.03858	.4004	.00111	409.62	188.89	.92394	1.00032	.6836
1000.	.0969	14995.4	.03801	.4003	.00100	444.71	202.95	1.10261	1.00029	.6838
1200.	.0808	18453.6	.03671	.4003	.00083	511.14	229.87	1.48254	1.00024	.6911
1400.	.0692	22141.7	.03533	.4002	.00071	583.50	255.50	1.91952	1.00021	.6921
1600.	.0606	26009.3	.03404	.4002	.00062	657.19	280.05	2.40349	1.00018	.6924
1800.	.0539	30169.3	.03270	.4002	.00056	737.67	303.67	2.94329	1.00016	.6897
2000.	.0485	35126.5	.03082	.4000	.00050	844.18	326.46	3.57117	1.00015	.6792
2200.	.0440	41922.4	.02791	.3996	.00046	1016.33	345.02	4.35867	1.00013	.6476
2400.	.0402	52368.5	.02383	.3986	.00042	1322.12	366.69	5.40149	1.00012	.6074
2600.	.0369	69056.7	.01912	.3963	.00039	1858.14	388.40	6.75598	1.00011	.5603
2800.	.0339	95093.0	.01469	.3921	.00036	2739.92	410.70	8.38984	1.00010	.5194
3000.	.0311	133455.3	.01112	.3848	.00035	4078.54	434.27	10.21507	1.00009	.4923

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.45 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.951	.01294	1.1908	.9284	-308.8	-302.9	4.977	4.70	6.39	1273.
14.	.01295	1.1978	.9284	-308.4	-302.6	5.000	4.71	6.40	1276.
15.	.01309	1.0769	.9229	-301.9	-296.0	5.458	4.91	6.94	1234.
16.	.01324	1.0090	.9041	-294.8	-288.8	5.920	5.10	7.37	1208.
17.	.01340	.9507	.8892	-287.3	-281.2	6.379	5.28	7.82	1186.
18.	.01357	.8876	.8744	-279.3	-273.2	6.841	5.45	8.31	1163.
19.	.01376	.8243	.8592	-270.8	-264.6	7.304	5.60	8.82	1140.
20.	.01397	.7601	.8420	-261.8	-255.5	7.770	5.73	9.37	1115.
21.	.01420	.6918	.8230	-252.2	-245.8	8.243	5.84	9.99	1087.
22.	.01445	.6269	.8017	-242.0	-235.5	8.722	5.94	10.65	1060.
23.	.01474	.5590	.7770	-231.1	-224.5	9.213	6.02	11.41	1030.
24.	.01506	.4892	.7477	-219.4	-212.6	9.717	6.08	12.31	995.
25.	.01543	.4187	.7130	-206.8	-199.8	10.239	6.14	13.37	955.
26.	.01588	.3456	.6711	-192.9	-185.8	10.790	6.19	14.74	907.
* 26.559	.01617	.3101	.6442	-184.5	-177.3	11.114	6.23	15.52	879.
* 26.559	.18180	.0554	.0262	120.3	202.1	25.405	6.95	17.79	377.
27.	.18855	.0596	.0250	124.9	209.7	25.691	6.86	16.93	383.
28.	.20287	.0682	.0229	134.6	225.9	26.280	6.72	15.56	397.
29.	.21626	.0761	.0212	143.7	241.0	26.809	6.63	14.64	410.
30.	.22901	.0833	.0198	152.2	255.3	27.294	6.57	13.99	421.
31.	.24126	.0901	.0187	160.5	269.0	27.745	6.52	13.50	432.
32.	.25315	.0966	.0177	168.4	282.3	28.167	6.48	13.11	442.
33.	.26473	.1029	.0168	176.2	295.3	28.566	6.45	12.80	452.
34.	.27606	.1089	.0160	183.7	308.0	28.944	6.42	12.54	461.
36.	.29814	.1204	.0147	198.5	332.6	29.649	6.37	12.14	479.
38.	.31962	.1314	.0137	212.8	356.6	30.297	6.34	11.85	496.
40.	.34065	.1420	.0128	226.8	380.1	30.899	6.32	11.54	511.
42.	.36132	.1523	.0120	240.6	403.2	31.463	6.31	11.47	526.
44.	.38171	.1624	.0113	254.2	426.0	31.994	6.31	11.35	540.
46.	.40187	.1723	.0107	267.7	448.6	32.496	6.31	11.25	554.
48.	.42183	.1819	.0102	281.2	471.0	32.973	6.32	11.17	567.
50.	.44163	.1915	.0097	294.5	493.3	33.427	6.34	11.11	579.
52.	.46128	.2009	.0093	307.9	515.5	33.862	6.35	11.07	591.
56.	.50025	.2195	.0085	334.6	559.7	34.682	6.43	11.04	614.
60.	.53885	.2377	.0079	361.4	603.9	35.444	6.53	11.07	635.
65.	.58671	.2601	.0072	395.5	659.5	36.334	6.72	11.18	658.
70.	.63424	.2822	.0066	430.5	715.9	37.170	6.96	11.37	679.
75.	.68151	.3041	.0062	466.7	773.4	37.963	7.26	11.53	698.
80.	.72857	.3259	.0058	504.4	832.3	38.723	7.61	11.95	715.
90.	.82224	.3689	.0051	585.4	955.5	40.173	8.42	12.70	746.
100.	.91547	.4115	.0046	674.7	1086.6	41.555	9.28	13.53	775.
110.	1.00837	.4539	.0041	772.3	1226.0	42.880	10.11	14.34	802.
120.	1.10105	.4961	.0038	877.6	1373.1	44.160	10.84	15.04	830.
130.	1.19355	.5381	.0035	989.3	1526.4	45.387	11.41	15.60	858.
140.	1.28591	.5799	.0032	1106.0	1684.6	46.559	11.83	16.01	886.
160.	1.47035	.6634	.0028	1347.8	2009.4	48.727	12.22	16.38	943.
180.	1.65450	.7467	.0025	1592.8	2337.3	50.658	12.19	16.35	1001.
200.	1.83846	.8297	.0023	1834.7	2662.0	52.368	11.95	16.10	1057.
220.	2.02229	.9127	.0021	2070.8	2980.8	53.888	11.63	15.78	1113.
240.	2.20601	.9956	.0019	2300.5	3293.3	55.247	11.33	15.47	1166.
260.	2.38966	1.0784	.0017	2524.7	3600.0	56.475	11.08	15.21	1217.
280.	2.57325	1.1611	.0016	2744.2	3902.2	57.595	10.87	15.01	1266.
300.	2.75664	1.2437	.0015	2960.3	4200.8	58.626	10.72	14.86	1313.
350.	3.21529	1.4503	.0013	3490.5	4937.4	60.896	10.51	14.64	1421.
400.	3.67382	1.6568	.0011	4013.7	5667.0	62.845	10.43	14.55	1521.
450.	4.13227	1.8632	.0010	4534.1	6393.7	64.558	10.41	14.53	1613.
500.	4.59066	2.0695	.0009	5054.6	7120.4	66.088	10.40	14.53	1700
550.	5.04901	2.2758	.0008	5574.6	7846.7	67.473	10.41	14.54	1783.
600.	5.50735	2.4821	.0008	6095.6	8573.9	68.737	10.43	14.55	1861.
700.	6.42396	2.8946	.0006	7140.6	10031.4	70.985	10.48	14.61	2008.
800.	7.34053	3.3071	.0006	8193.2	11496.4	72.940	10.57	14.70	2144.
900.	8.25707	3.7196	.0005	9256.5	12972.2	74.677	10.70	14.82	2270.
1000.	9.17360	4.1321	.0005	10333.8	14461.9	76.249	10.86	14.98	2388.
1200.	11.00662	4.9570	.0004	12544.1	17497.0	79.002	11.24	15.37	2603.
1400.	12.83964	5.7818	.0003	14836.8	20614.7	81.409	11.68	15.81	2797.
1600.	14.67280	6.6067	.0003	17217.3	23820.1	83.526	12.12	16.25	2976.
1800.	16.50700	7.4315	.0003	19694.5	27122.6	85.433	12.61	16.74	3141.
2000.	18.34565	8.2564	.0002	22301.3	30556.8	87.308	13.36	17.53	3291.
2200.	20.19848	9.0812	.0002	25113.5	34202.9	89.717	14.71	18.97	3423.
2400.	22.08751	9.9061	.0002	28311.1	38250.5	92.522	17.16	21.65	3535.
2600.	24.05444	10.7309	.0002	32192.0	43016.5	95.731	21.32	26.30	3636.
2800.	26.16841	11.5557	.0002	37196.7	48972.5	99.331	27.83	33.71	3738.
3000.	28.53263	12.3806	.0002	43910.7	56750.4	103.311	37.20	44.65	3851.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.45 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 13.951	77.2682	632.9	.25593	92.0130	.01009	74.46	257.57	.00054	1.25246	2.2092
14.	77.2204	637.1	.25549	92.4910	.01004	74.94	255.65	.00055	1.25229	2.1815
15.	76.4169	618.8	.24609	82.2925	.01121	83.56	224.94	.00057	1.24947	1.8679
16.	75.5384	621.5	.23463	76.2168	.01186	89.55	200.17	.00058	1.24638	1.6481
17.	74.6359	624.1	.22553	70.9596	.01253	93.56	180.43	.00058	1.24322	1.5083
18.	73.6679	621.2	.21781	65.3899	.01337	96.38	163.94	.00057	1.23983	1.4130
19.	72.6516	614.9	.21124	59.8860	.01435	98.02	150.12	.00055	1.23628	1.3511
20.	71.5763	605.4	.20534	54.4031	.01548	99.49	138.28	.00053	1.23253	1.3024
21.	70.4227	591.3	.20002	48.7195	.01689	101.16	127.89	.00052	1.22852	1.2628
22.	69.1922	576.3	.19508	43.3793	.01848	102.07	118.70	.00050	1.22425	1.2366
23.	67.8567	557.2	.19024	37.9315	.02049	102.26	110.35	.00048	1.21962	1.2318
24.	66.3999	534.6	.18505	32.4811	.02302	101.78	102.67	.00045	1.21459	1.2413
25.	64.7944	508.7	.17924	27.1268	.02629	100.65	95.47	.00042	1.20906	1.2683
26.	62.9732	477.9	.17207	21.7659	.03083	98.75	88.50	.00038	1.20281	1.3205
* 26.559	61.8352	462.1	.16730	19.1753	.03360	97.35	84.64	.00037	1.19891	1.3496
* 26.559	5.5006	207.2	.06848	.3048	.08585	26.38	15.64	.00097	1.01667	1.0547
27.	5.3036	214.0	.06872	.3160	.07912	26.29	15.81	.00105	1.01607	1.0187
28.	4.9293	228.8	.06903	.3363	.06801	26.33	16.23	.00124	1.01493	.9590
29.	4.6240	243.0	.06912	.3517	.06027	26.57	16.66	.00141	1.01400	.9179
30.	4.3667	256.7	.06911	.3638	.05449	26.94	17.09	.00159	1.01322	.8874
31.	4.1448	270.1	.06906	.3736	.04997	27.43	17.52	.00177	1.01254	.8623
32.	3.9503	283.2	.06900	.3817	.04630	27.96	17.96	.00194	1.01195	.8422
33.	3.7774	296.1	.06891	.3886	.04324	28.51	18.40	.00212	1.01143	.8260
34.	3.6224	308.4	.06894	.3944	.04065	29.08	18.83	.00231	1.01096	.8119
36.	3.3541	332.8	.06892	.4039	.03647	30.27	19.70	.00268	1.01014	.7900
38.	3.1287	356.8	.06882	.4112	.03322	31.50	20.55	.00306	1.00946	.7735
40.	2.9356	380.5	.06868	.4169	.03058	32.76	21.40	.00345	1.00887	.7603
42.	2.7676	404.0	.06851	.4216	.02840	34.03	22.23	.00386	1.00836	.7496
44.	2.6198	427.4	.06831	.4254	.02654	35.32	23.06	.00428	1.00792	.7406
46.	2.4884	450.7	.06808	.4286	.02495	36.62	23.87	.00471	1.00752	.7328
48.	2.3706	474.1	.06780	.4313	.02356	37.94	24.67	.00516	1.00716	.7262
50.	2.2644	497.6	.06748	.4336	.02233	39.26	25.45	.00562	1.00684	.7205
52.	2.1679	521.3	.06709	.4356	.02124	40.59	26.23	.00609	1.00655	.7157
56.	1.9990	570.0	.06613	.4387	.01937	43.26	27.76	.00706	1.00604	.7085
60.	1.8558	620.7	.06488	.4411	.01784	46.02	29.24	.00806	1.00560	.7034
65.	1.7044	688.2	.06292	.4433	.01625	49.79	31.04	.00940	1.00514	.6972
70.	1.5767	761.2	.06057	.4450	.01494	53.58	32.73	.01076	1.00476	.6961
75.	1.4673	840.5	.05794	.4463	.01384	57.30	34.49	.01209	1.00443	.7002
80.	1.3726	926.6	.05519	.4473	.01290	61.15	36.15	.01342	1.00414	.7064
90.	1.2162	1118.2	.04978	.4487	.01136	70.99	39.35	.01654	1.00367	.7042
100.	1.0923	1331.5	.04507	.4495	.01016	80.84	42.40	.01969	1.00329	.7099
110.	.9917	1558.5	.04130	.4501	.00920	92.52	44.81	.02342	1.00299	.6946
120.	.9082	1789.2	.03849	.4505	.00841	103.12	47.64	.02717	1.00274	.6950
130.	.8378	2015.0	.03652	.4508	.00774	113.13	50.38	.03115	1.00253	.6949
140.	.7777	2230.2	.03520	.4510	.00718	122.06	53.05	.03529	1.00234	.6958
160.	.6801	2614.7	.03403	.4512	.00627	136.58	58.18	.04413	1.00205	.6979
180.	.6044	2939.3	.03407	.4513	.00556	147.72	63.10	.05382	1.00182	.6983
200.	.5439	3219.2	.03473	.4513	.00500	156.79	67.83	.06446	1.00164	.6965
220.	.4945	3473.1	.03564	.4513	.00454	164.75	72.41	.07601	1.00149	.6935
240.	.4533	3716.6	.03658	.4513	.00416	172.19	76.85	.08838	1.00137	.6905
260.	.4185	3960.1	.03740	.4513	.00384	179.44	81.17	.10147	1.00126	.6882
280.	.3886	4208.4	.03808	.4512	.00357	186.68	85.38	.11521	1.00117	.6865
300.	.3628	4463.4	.03861	.4512	.00333	193.99	89.50	.12959	1.00109	.6854
350.	.3110	5132.4	.03936	.4511	.00285	212.58	99.42	.16808	1.00094	.6846
400.	.2722	5831.4	.03966	.4510	.00250	231.46	108.88	.21033	1.00082	.6846
450.	.2420	6550.4	.03973	.4509	.00222	250.30	117.96	.25620	1.00073	.6849
500.	.2178	7274.6	.03974	.4508	.00200	268.88	126.71	.30588	1.00066	.6846
550.	.1981	8005.9	.03970	.4507	.00182	287.13	135.19	.35906	1.00060	.6843
600.	.1816	8742.5	.03963	.4507	.00166	305.06	143.41	.41566	1.00055	.6841
700.	.1557	10236.9	.03941	.4506	.00143	340.20	159.23	.53864	1.00047	.6837
800.	.1362	11770.9	.03906	.4505	.00125	374.88	174.35	.67404	1.00041	.6836
900.	.1211	13355.1	.03859	.4505	.00111	409.62	188.89	.82138	1.00036	.6836
1000.	.1090	14996.9	.03802	.4504	.00100	444.71	202.95	.98021	1.00033	.6838
1200.	.0909	18455.2	.03671	.4504	.00083	511.14	229.87	1.31793	1.00027	.6911
1400.	.0779	22143.1	.03533	.4503	.00071	583.49	255.50	1.70636	1.00023	.6921
1600.	.0682	26008.1	.03405	.4503	.00062	657.07	280.05	2.13644	1.00021	.6924
1800.	.0606	30153.8	.03273	.4502	.00056	736.99	303.67	2.61552	1.00018	.6899
2000.	.0545	35057.3	.03090	.4500	.00050	841.43	326.45	3.17064	1.00016	.6800
2200.	.0495	41700.0	.02809	.4496	.00045	1007.75	345.01	3.86252	1.00015	.6495
2400.	.0453	51790.9	.02414	.4485	.00042	1300.09	366.65	4.77442	1.00014	.6106
2600.	.0416	67779.0	.01952	.4461	.00039	1809.77	388.31	5.95974	1.00013	.5642
2800.	.0382	92613.9	.01511	.4416	.00036	2646.52	410.52	7.39679	1.00012	.5228
3000.	.0350	129163.9	.01151	.4339	.00035	3917.37	433.91	9.01166	1.00011	.4946

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.968	.01294	1.1940	.9290	-308.7	-302.3	4.978	4.70	6.39	1274.
14.	.01294	1.2053	.9289	-308.5	-302.0	4.994	4.70	6.38	1279.
15.	.01308	1.0819	.9246	-302.0	-295.4	5.451	4.91	6.93	1237.
16.	.01323	1.0138	.9058	-294.9	-288.3	5.913	5.10	7.37	1210.
17.	.01339	.9559	.8908	-287.4	-280.7	6.370	5.28	7.81	1189.
18.	.01356	.8927	.8759	-279.4	-272.7	6.832	5.45	8.29	1166.
19.	.01375	.8295	.8607	-271.0	-264.1	7.294	5.60	8.81	1142.
20.	.01396	.7653	.8436	-262.0	-255.0	7.760	5.73	9.35	1118.
21.	.01419	.6968	.8246	-252.4	-245.3	8.231	5.84	9.96	1090.
22.	.01444	.6323	.8035	-242.3	-235.1	8.709	5.94	10.62	1063.
23.	.01472	.5647	.7790	-231.4	-224.1	9.198	6.02	11.37	1033.
24.	.01504	.4952	.7500	-219.8	-212.3	9.700	6.08	12.25	998.
25.	.01541	.4251	.7158	-207.3	-199.6	10.219	6.14	13.29	959.
26.	.01584	.3527	.6746	-193.5	-185.6	10.766	6.19	14.61	912.
27.	.01638	.2793	.6263	-178.4	-170.2	11.348	6.25	16.43	856.
* 27.116	.01645	.2724	.6200	-176.4	-168.2	11.421	6.26	16.62	850.
* 27.116	.16290	.0528	.0296	119.0	200.5	25.025	7.00	18.92	378.
28.	.17542	.0614	.0270	128.6	216.3	25.600	6.84	17.03	391.
29.	.18839	.0701	.0247	138.4	232.6	26.172	6.72	15.59	405.
30.	.20054	.0780	.0229	147.5	247.8	26.688	6.64	14.78	417.
31.	.21210	.0854	.0215	156.2	262.2	27.161	6.58	14.12	428.
32.	.22323	.0923	.0203	164.5	276.1	27.601	6.53	13.52	439.
33.	.23401	.0988	.0192	172.5	289.6	28.015	6.50	13.23	449.
34.	.24452	.1051	.0183	180.4	302.6	28.405	6.45	12.90	458.
36.	.26489	.1171	.0167	195.5	327.9	29.128	6.40	12.42	477.
38.	.28462	.1285	.0154	210.1	352.4	29.789	6.36	12.07	494.
40.	.30387	.1394	.0144	224.3	376.2	30.402	6.34	11.82	510.
42.	.32275	.1500	.0135	238.3	399.7	30.973	6.33	11.63	525.
44.	.34133	.1603	.0127	252.1	422.8	31.511	6.32	11.47	539.
46.	.35967	.1703	.0120	265.8	445.6	32.018	6.32	11.36	553.
48.	.37782	.1802	.0114	279.3	468.2	32.499	6.33	11.27	566.
50.	.39579	.1899	.0108	292.8	490.7	32.958	6.34	11.20	579.
52.	.41363	.1994	.0104	306.2	513.0	33.396	6.37	11.15	591.
56.	.44894	.2182	.0095	333.1	557.5	34.221	6.44	11.11	614.
60.	.48388	.2366	.0088	360.1	602.0	34.987	6.54	11.12	634.
65.	.52716	.2593	.0080	394.3	657.8	35.881	6.72	11.23	658.
70.	.57010	.2816	.0074	429.4	714.4	36.720	6.97	11.41	679.
75.	.61279	.3036	.0069	465.7	772.1	37.515	7.27	11.66	698.
80.	.65527	.3254	.0064	503.5	831.1	38.277	7.62	11.97	715.
90.	.73977	.3687	.0057	584.6	954.5	39.730	8.42	12.72	746.
100.	.82383	.4115	.0051	674.0	1085.9	41.113	9.28	13.55	775.
110.	.90757	.4540	.0046	771.7	1225.4	42.440	10.11	14.35	803.
120.	.99107	.4962	.0042	877.0	1372.6	43.721	10.84	15.05	830.
130.	1.07441	.5383	.0039	988.8	1526.0	44.949	11.41	15.51	858.
140.	1.15760	.5802	.0036	1105.5	1684.3	46.121	11.83	16.02	886.
160.	1.32371	.6638	.0031	1347.4	2009.2	48.290	12.22	16.39	944.
180.	1.48953	.7472	.0028	1592.4	2337.2	50.222	12.19	16.35	1001.
200.	1.65516	.8303	.0025	1834.4	2662.0	51.932	11.95	16.10	1058.
220.	1.82065	.9133	.0023	2070.5	2980.8	53.452	11.64	15.78	1113.
240.	1.98605	.9962	.0021	2300.3	3293.3	54.812	11.33	15.47	1166.
260.	2.15136	1.0790	.0019	2524.5	3600.2	56.040	11.08	15.22	1217.
280.	2.31662	1.1618	.0018	2744.0	3902.4	57.160	10.87	15.01	1266.
300.	2.48169	1.2445	.0017	2960.2	4201.0	58.191	10.72	14.86	1313.
350.	2.89453	1.4511	.0014	3490.4	4937.7	60.461	10.51	14.64	1422.
400.	3.30723	1.6576	.0013	4013.6	5667.3	62.411	10.43	14.56	1521.
450.	3.71985	1.8640	.0011	4534.1	6394.0	64.124	10.41	14.53	1613.
500.	4.13242	2.0703	.0010	5054.5	7120.7	65.654	10.40	14.53	1701.
550.	4.54495	2.2767	.0009	5574.6	7847.0	67.038	10.41	14.54	1783.
600.	4.95746	2.4830	.0008	6095.6	8574.3	68.302	10.43	14.55	1862.
700.	5.78242	2.8955	.0007	7140.6	10031.8	70.550	10.48	14.61	2009.
800.	6.60734	3.3080	.0006	8193.1	11496.8	72.505	10.57	14.70	2144.
900.	7.43224	3.7205	.0006	9256.5	12972.6	74.242	10.70	14.82	2270.
1000.	8.25712	4.1330	.0005	10333.8	14462.3	75.814	10.86	14.98	2388.
1200.	9.90685	4.9578	.0004	12544.0	17497.5	78.568	11.24	15.37	2603.
1400.	11.55656	5.7827	.0004	14836.8	20615.1	80.975	11.68	15.81	2797.
1600.	13.20641	6.6076	.0003	17217.1	23820.3	83.092	12.12	16.24	2976.
1800.	14.85713	7.4324	.0003	19693.5	27122.1	84.998	12.60	16.74	3142.
2000.	16.51165	8.2573	.0003	22297.0	30552.8	86.871	13.33	17.50	3292.
2200.	18.17829	9.0821	.0002	25098.7	34187.8	89.275	14.63	18.88	3424.
2400.	19.87583	9.9070	.0002	28269.2	38207.1	92.068	16.97	21.44	3538.
2600.	21.63989	10.7318	.0002	32091.0	42910.9	95.252	20.94	25.86	3640.
2800.	23.52951	11.5566	.0002	36981.9	48746.6	98.807	27.13	32.91	3741.
3000.	25.63286	12.3815	.0002	43497.1	56313.6	102.715	36.04	43.31	3853.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.50 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.968	77.2965	634.5	.25586	92.2941	.01007	74.66	257.88	.00054	1.25256	2.2061
14.	77.2625	639.9	.25557	93.1235	.00998	74.98	256.56	.00055	1.25244	2.1842
15.	76.4616	620.4	.24647	82.7270	.01118	83.62	225.71	.00057	1.24962	1.8716
16.	75.5862	623.1	.23499	76.6271	.01182	89.63	200.85	.00058	1.24655	1.6506
17.	74.6876	626.0	.22585	71.3910	.01248	93.65	181.04	.00058	1.24340	1.5099
18.	73.7238	623.1	.21812	65.8110	.01331	96.49	164.50	.00057	1.24003	1.4140
19.	72.7116	617.0	.21153	60.3138	.01427	98.15	150.63	.00055	1.23649	1.3514
20.	71.6412	607.7	.20563	54.8242	.01539	99.63	138.76	.00054	1.23276	1.3022
21.	70.4941	593.6	.20030	49.1229	.01679	101.32	128.35	.00052	1.22877	1.2621
22.	69.2711	578.8	.19535	43.7989	.01834	102.25	119.14	.00050	1.22452	1.2372
23.	67.9460	560.1	.19052	38.3717	.02030	102.47	110.79	.00048	1.21993	1.2294
24.	66.5013	537.8	.18538	32.9286	.02278	102.02	103.11	.00045	1.21494	1.2379
25.	64.9113	512.3	.17963	27.5906	.02594	100.93	95.91	.00042	1.20946	1.2629
26.	63.1156	482.2	.17263	22.2624	.03030	99.09	88.98	.00039	1.20330	1.3120
27.	61.0558	447.2	.16402	17.0511	.03673	96.50	82.17	.00035	1.19625	1.3988
* 27.116	60.7811	443.9	.16287	16.5588	.03744	96.11	81.33	.00034	1.19531	1.4065
* 27.116	6.1386	207.3	.06874	.3240	.09124	27.63	16.10	.00086	1.01862	1.1024
28.	5.7006	221.3	.06912	.3503	.07695	27.33	16.44	.00101	1.01728	1.0239
29.	5.3082	236.3	.06929	.3723	.06639	27.35	16.84	.00118	1.01609	.9656
30.	4.9866	250.6	.06931	.3891	.05897	27.58	17.25	.00135	1.01511	.9246
31.	4.7147	264.5	.06927	.4024	.05340	27.99	17.67	.00151	1.01428	.8918
32.	4.4797	278.0	.06922	.4133	.04901	28.46	18.10	.00168	1.01356	.8664
33.	4.2733	291.2	.06912	.4223	.04544	28.97	18.53	.00184	1.01293	.8461
34.	4.0897	303.8	.06918	.4300	.04247	29.50	18.96	.00201	1.01238	.8290
36.	3.7752	328.6	.06918	.4422	.03778	30.63	19.81	.00235	1.01142	.8028
38.	3.5135	353.0	.06908	.4515	.03420	31.83	20.66	.00270	1.01063	.7835
40.	3.2909	377.1	.06894	.4588	.03134	33.06	21.49	.00306	1.00995	.7684
42.	3.0984	400.8	.06876	.4647	.02900	34.31	22.32	.00343	1.00937	.7563
44.	2.9297	424.5	.06854	.4696	.02703	35.58	23.14	.00381	1.00885	.7462
46.	2.7803	448.0	.06830	.4736	.02535	36.87	23.95	.00420	1.00840	.7377
48.	2.6468	471.6	.06801	.4769	.02389	38.17	24.74	.00461	1.00800	.7304
50.	2.5266	495.3	.06767	.4797	.02261	39.48	25.53	.00502	1.00763	.7241
52.	2.4176	519.2	.06728	.4822	.02148	40.80	26.30	.00545	1.00730	.7189
56.	2.2275	568.1	.06629	.4861	.01955	43.46	27.82	.00632	1.00673	.7110
60.	2.0666	619.0	.06503	.4890	.01797	46.20	29.30	.00723	1.00624	.7055
65.	1.8970	686.7	.06306	.4918	.01635	49.96	31.10	.00844	1.00573	.6988
70.	1.7541	759.9	.06069	.4939	.01502	53.73	32.84	.00967	1.00529	.6974
75.	1.6319	839.3	.05805	.4954	.01389	57.44	34.54	.01086	1.00493	.7013
80.	1.5261	925.5	.05529	.4967	.01294	61.28	36.19	.01207	1.00461	.7073
90.	1.3518	1117.3	.04986	.4984	.01139	71.11	39.33	.01488	1.00408	.7048
100.	1.2138	1330.7	.04513	.4995	.01018	80.95	42.44	.01772	1.00366	.7103
110.	1.1018	1557.9	.04135	.5002	.00921	92.57	44.82	.02107	1.00332	.6950
120.	1.0090	1788.8	.03854	.5007	.00842	103.16	47.65	.02445	1.00304	.6954
130.	.9307	2014.7	.03656	.5010	.00775	113.17	50.39	.02804	1.00281	.6951
140.	.8639	2230.1	.03524	.5012	.00718	122.09	53.05	.03177	1.00261	.6960
160.	.7555	2614.9	.03406	.5015	.00627	136.61	58.19	.03972	1.00228	.6981
180.	.6714	2939.7	.03409	.5016	.00556	147.74	63.10	.04845	1.00202	.6984
200.	.6042	3219.9	.03475	.5016	.00500	156.81	67.83	.05803	1.00182	.6966
220.	.5493	3473.9	.03566	.5016	.00454	164.76	72.41	.06842	1.00166	.6936
240.	.5035	3717.5	.03659	.5016	.00416	172.20	76.85	.07956	1.00152	.6906
260.	.4648	3961.1	.03742	.5016	.00384	179.46	81.17	.09134	1.00140	.6883
280.	.4317	4209.5	.03810	.5015	.00357	186.70	85.39	.10372	1.00130	.6866
300.	.4030	4464.5	.03862	.5015	.00333	194.00	89.50	.11666	1.00121	.6854
350.	.3455	5133.6	.03938	.5013	.00285	212.59	99.42	.15131	1.00104	.6847
400.	.3024	5832.7	.03967	.5012	.00250	231.47	108.88	.18934	1.00091	.6847
450.	.2688	6551.7	.03974	.5011	.00222	250.31	117.96	.23063	1.00081	.6849
500.	.2420	7276.0	.03974	.5010	.00200	268.89	126.71	.27535	1.00073	.6846
550.	.2200	8007.3	.03970	.5009	.00182	287.14	135.19	.32322	1.00066	.6843
600.	.2017	8743.9	.03963	.5009	.00166	305.07	143.41	.37416	1.00061	.6841
700.	.1729	10238.4	.03941	.5007	.00143	340.20	159.23	.48485	1.00052	.6837
800.	.1513	11772.4	.03906	.5007	.00125	374.89	174.35	.60672	1.00046	.6836
900.	.1345	13356.6	.03859	.5006	.00111	409.62	188.89	.73933	1.00041	.6836
1000.	.1211	14998.5	.03802	.5005	.00100	444.72	202.95	.88228	1.00036	.6838
1200.	.1009	18456.9	.03672	.5004	.00083	511.14	229.87	1.18624	1.00030	.6911
1400.	.0865	22144.5	.03533	.5004	.00071	583.48	255.50	1.53583	1.00026	.6921
1600.	.0757	26007.4	.03406	.5003	.00062	656.97	280.05	1.92282	1.00023	.6924
1800.	.0673	30140.9	.03275	.5003	.00056	736.42	303.67	2.35342	1.00020	.6901
2000.	.0606	34998.9	.03097	.5001	.00050	839.11	326.45	2.85075	1.00018	.6807
2200.	.0550	41512.2	.02825	.4996	.00045	1000.49	345.01	3.46717	1.00017	.6512
2400.	.0503	51302.3	.02440	.4984	.00042	1281.45	366.63	4.27608	1.00015	.6135
2600.	.0462	66697.4	.01988	.4959	.00039	1768.81	388.25	5.32782	1.00014	.5677
2800.	.0425	90512.2	.01549	.4912	.00036	2567.31	410.36	6.60834	1.00013	.5260
3000.	.0390	125516.5	.01185	.4830	.00035	3780.36	433.60	8.05486	1.00012	.4967

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.55 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.985	.01293	1.1972	.9296	-308.7	-301.6	4.979	4.70	6.39	1276.
	14.	.01294	1.2128	.9295	-308.6	-301.5	4.987	4.70	6.37	1282.
	15.	.01307	1.0870	.9264	-302.1	-294.9	5.444	4.91	6.93	1239.
	16.	.01322	1.0269	.9080	-295.1	-287.8	5.902	5.10	7.34	1216.
	17.	.01338	.9610	.8923	-287.5	-280.2	6.362	5.28	7.80	1192.
	18.	.01355	.8977	.8775	-279.6	-272.1	6.823	5.44	8.28	1168.
	19.	.01374	.8347	.8623	-271.2	-263.6	7.284	5.59	8.79	1145.
	20.	.01395	.7704	.8452	-262.2	-254.5	7.749	5.72	9.33	1121.
	21.	.01417	.7053	.8264	-252.7	-244.9	8.219	5.84	9.92	1095.
	22.	.01442	.6376	.8052	-242.6	-234.6	8.696	5.94	10.59	1066.
	23.	.01470	.5704	.7809	-231.8	-223.7	9.183	6.02	11.33	1036.
	24.	.01501	.5022	.7523	-220.2	-212.0	9.682	6.08	12.18	1003.
	25.	.01538	.4314	.7184	-207.7	-199.3	10.200	6.14	13.21	964.
	26.	.01581	.3597	.6780	-194.1	-185.4	10.742	6.19	14.49	918.
	27.	.01633	.2864	.6305	-179.1	-170.2	11.319	6.25	16.25	863.
*	27.636	.01674	.2427	.5967	-168.5	-159.3	11.715	6.30	17.66	825.
*	27.636	.14714	.0500	.0331	117.4	198.4	24.665	7.07	20.19	378.
	28.	.15228	.0540	.0317	121.8	205.5	24.924	6.98	19.07	384.
	29.	.16516	.0638	.0287	132.7	223.5	25.554	6.82	17.02	399.
	30.	.17696	.0725	.0264	142.5	239.8	26.108	6.72	15.74	412.
	31.	.18804	.0804	.0245	151.7	255.1	26.609	6.64	14.86	424.
	32.	.19860	.0878	.0230	160.4	269.6	27.070	6.59	14.21	435.
	33.	.20877	.0947	.0217	168.8	283.6	27.500	6.54	13.71	445.
	34.	.21862	.1013	.0206	176.9	297.1	27.903	6.49	13.30	456.
	36.	.23763	.1138	.0188	192.4	323.1	28.645	6.42	12.71	475.
	38.	.25595	.1256	.0173	207.3	348.1	29.321	6.38	12.30	492.
	40.	.27375	.1368	.0161	221.8	372.4	29.944	6.35	12.01	508.
	42.	.29117	.1476	.0150	236.0	396.1	30.524	6.34	11.78	524.
	44.	.30828	.1581	.0141	250.0	419.5	31.068	6.33	11.61	538.
	46.	.32515	.1684	.0133	263.8	442.6	31.581	6.33	11.47	552.
	48.	.34181	.1784	.0127	277.5	465.4	32.067	6.34	11.37	566.
	50.	.35829	.1883	.0120	291.0	488.1	32.531	6.35	11.29	578.
	52.	.37463	.1980	.0115	304.6	510.6	32.971	6.37	11.23	591.
	56.	.40696	.2170	.0105	331.6	555.4	33.801	6.44	11.17	613.
	60.	.43891	.2356	.0097	358.7	600.1	34.572	6.54	11.18	634.
	65.	.47844	.2584	.0089	393.0	656.2	35.470	6.73	11.27	658.
	70.	.51763	.2809	.0082	428.2	712.9	36.311	6.97	11.45	679.
	75.	.55657	.3031	.0076	464.7	770.8	37.109	7.27	11.69	698.
	80.	.59530	.3250	.0071	502.6	830.0	37.873	7.62	12.00	716.
	90.	.67230	.3685	.0063	583.8	953.6	39.328	8.42	12.74	747.
	100.	.74886	.4114	.0056	673.3	1085.1	40.713	9.28	13.57	775.
	110.	.82509	.4540	.0051	771.0	1224.8	42.042	10.12	14.36	803.
	120.	.90110	.4964	.0046	876.5	1372.1	43.323	10.84	15.06	831.
	130.	.97693	.5385	.0043	988.3	1525.6	44.552	11.41	15.62	859.
	140.	1.05263	.5805	.0040	1105.0	1684.0	45.725	11.83	16.02	887.
	150.	1.20373	.6642	.0035	1347.0	2009.1	47.895	12.22	16.40	944.
	180.	1.35455	.7476	.0031	1592.1	2337.1	49.827	12.19	16.36	1002.
	200.	1.50518	.8308	.0028	1834.1	2661.9	51.537	11.95	16.11	1058.
	220.	1.65568	.9139	.0025	2070.3	2980.9	53.058	11.64	15.79	1113.
	240.	1.80607	.9968	.0023	2300.1	3293.4	54.418	11.33	15.48	1167.
	260.	1.95639	1.0797	.0021	2524.3	3600.3	55.646	11.08	15.22	1218.
	280.	2.10665	1.1625	.0020	2743.9	3902.5	56.766	10.88	15.01	1267.
	300.	2.25674	1.2452	.0018	2960.0	4201.2	57.797	10.72	14.86	1314.
	350.	2.63208	1.4518	.0016	3490.3	4938.0	60.067	10.51	14.64	1422.
	400.	3.00729	1.6584	.0014	4013.6	5667.6	62.017	10.43	14.56	1522.
	450.	3.38242	1.8648	.0012	4534.0	6394.3	63.730	10.41	14.53	1614.
	500.	3.75749	2.0712	.0011	5054.4	7121.1	65.260	10.40	14.53	1701.
	550.	4.13253	2.2775	.0010	5574.5	7847.4	66.645	10.41	14.54	1783.
	600.	4.50755	2.4838	.0009	6095.5	8574.7	67.909	10.43	14.55	1862.
	700.	5.25753	2.8964	.0008	7140.6	10032.2	70.157	10.48	14.61	2009.
	800.	6.00746	3.3089	.0007	8193.1	11497.2	72.112	10.57	14.70	2145.
	900.	6.75737	3.7214	.0006	9256.5	12973.1	73.849	10.70	14.82	2271.
	1000.	7.50727	4.1338	.0006	10333.7	14462.7	75.421	10.86	14.98	2388.
	1200.	9.00703	4.9587	.0005	12544.0	17497.9	78.175	11.24	15.37	2603.
	1400.	10.50677	5.7836	.0004	14836.8	20615.5	80.581	11.68	15.81	2797.
	1600.	12.00663	6.6085	.0003	17217.0	23820.7	82.698	12.12	16.24	2976.
	1800.	13.50724	7.4333	.0003	19692.7	27121.7	84.604	12.60	16.73	3142.
	2000.	15.01115	8.2582	.0003	22293.3	30549.4	86.476	13.31	17.47	3293.
	2200.	16.52556	9.0830	.0003	25085.9	34175.0	88.875	14.56	18.81	3426.
	2400.	18.06676	9.9079	.0002	28233.1	38169.9	91.658	16.80	21.26	3540.
	2600.	19.66561	10.7327	.0002	32004.1	42820.2	94.820	20.60	25.49	3643.
	2800.	21.37332	11.5575	.0002	36797.0	48552.3	98.338	26.53	32.22	3744.
	3000.	23.26633	12.3824	.0002	43141.3	55937.8	102.182	35.05	42.15	3855.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.55 MPA ISOBAR

TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 13.985	77.3248	636.2	.25579	92.5755	.01004	74.87	258.19	.00055	1.25266	2.2029
14.	77.3044	642.7	.25564	93.7544	.00991	75.02	257.45	.00055	1.25259	2.1870
15.	76.5060	622.0	.24685	83.1601	.01114	83.68	226.49	.00057	1.24978	1.8753
16.	75.6549	628.1	.23547	77.6879	.01169	89.74	201.83	.00058	1.24679	1.6512
17.	74.7391	627.8	.22617	71.8206	.01242	93.75	181.65	.00058	1.24358	1.5114
18.	73.7793	625.0	.21843	66.2301	.01325	96.60	165.06	.00057	1.24022	1.4150
19.	72.7713	619.2	.21183	60.7395	.01420	98.28	151.14	.00055	1.23670	1.3518
20.	71.7056	609.9	.20593	55.2433	.01530	99.78	139.23	.00054	1.23298	1.3021
21.	70.5699	597.5	.20059	49.7743	.01660	101.50	128.83	.00052	1.22903	1.2592
22.	69.3493	581.4	.19562	44.2157	.01821	102.44	119.58	.00050	1.22479	1.2358
23.	68.0343	563.0	.19080	38.8082	.02012	102.68	111.23	.00048	1.22024	1.2271
24.	66.6035	541.5	.18570	33.4473	.02249	102.27	103.55	.00045	1.21529	1.2332
25.	65.0266	515.8	.18002	28.0498	.02561	101.21	96.36	.00042	1.20986	1.2579
26.	63.2551	486.4	.17318	22.7511	.02980	99.42	89.45	.00039	1.20377	1.3041
27.	61.2276	451.9	.16476	17.5347	.03596	96.89	82.68	.00035	1.19684	1.3865
* 27.636	59.7376	429.1	.15856	14.4957	.04116	94.80	78.30	.00032	1.19175	1.4587
* 27.636	6.7960	207.2	.06897	.3400	.09741	28.92	16.56	.00076	1.02063	1.1558
28.	6.5668	213.4	.06916	.3548	.08939	28.63	16.68	.00082	1.01993	1.1111
29.	6.0548	229.3	.06942	.3865	.07422	28.29	17.04	.00099	1.01836	1.0253
30.	5.6511	244.4	.06949	.4096	.06440	28.31	17.43	.00115	1.01713	.9690
31.	5.3181	258.8	.06947	.4275	.05741	28.62	17.84	.00130	1.01612	.9260
32.	5.0353	272.7	.06942	.4419	.05210	29.01	18.25	.00146	1.01525	.8937
33.	4.7900	286.3	.06933	.4536	.04789	29.46	18.67	.00162	1.01451	.8685
34.	4.5741	299.1	.06941	.4634	.04447	29.95	19.09	.00177	1.01385	.8477
36.	4.2082	324.4	.06944	.4789	.03918	31.02	19.93	.00209	1.01274	.8165
38.	3.9071	349.2	.06935	.4906	.03523	32.17	20.76	.00241	1.01182	.7941
40.	3.6529	373.6	.06919	.4997	.03214	33.37	21.59	.00274	1.01105	.7768
42.	3.4344	397.7	.06900	.5070	.02963	34.60	22.41	.00308	1.01039	.7633
44.	3.2438	421.6	.06878	.5130	.02754	35.85	23.22	.00343	1.00981	.7521
46.	3.0755	445.3	.06852	.5179	.02576	37.12	24.03	.00379	1.00930	.7427
48.	2.9256	469.1	.06822	.5220	.02423	38.41	24.82	.00416	1.00884	.7347
50.	2.7910	493.0	.06787	.5255	.02290	39.70	25.60	.00454	1.00843	.7279
52.	2.6693	517.1	.06747	.5284	.02172	41.01	26.37	.00492	1.00807	.7222
56.	2.4573	566.2	.06646	.5332	.01973	43.65	27.88	.00572	1.00742	.7136
60.	2.2784	617.3	.06519	.5368	.01811	46.38	29.35	.00656	1.00688	.7076
65.	2.0901	685.2	.06319	.5401	.01645	50.13	31.15	.00766	1.00631	.7004
70.	1.9319	758.5	.06081	.5426	.01509	53.89	32.89	.00877	1.00583	.6986
75.	1.7967	838.1	.05817	.5445	.01395	57.57	34.59	.00987	1.00542	.7025
80.	1.6798	924.4	.05539	.5460	.01298	61.41	36.24	.01097	1.00507	.7082
90.	1.4874	1116.3	.04994	.5481	.01142	71.23	39.42	.01353	1.00449	.7053
100.	1.3354	1329.9	.04520	.5494	.01020	81.07	42.47	.01611	1.00403	.7107
110.	1.2120	1557.3	.04140	.5502	.00922	92.62	44.84	.01915	1.00366	.6954
120.	1.1098	1788.3	.03858	.5508	.00842	103.21	47.66	.02222	1.00335	.6957
130.	1.0236	2014.4	.03660	.5512	.00775	113.21	50.40	.02549	1.00309	.6954
140.	.9500	2229.9	.03527	.5515	.00719	122.13	53.06	.02888	1.00287	.6962
160.	.8308	2615.0	.03409	.5518	.00627	136.64	58.19	.03612	1.00251	.6982
180.	.7383	2940.2	.03412	.5519	.00556	147.77	63.11	.04405	1.00223	.6985
200.	.6644	3220.5	.03477	.5520	.00500	156.83	67.84	.05276	1.00200	.6967
220.	.6040	3474.7	.03568	.5520	.00454	164.78	72.41	.06222	1.00182	.6937
240.	.5537	3718.4	.03661	.5519	.00416	172.22	76.86	.07235	1.00167	.6907
260.	.5111	3962.1	.03744	.5519	.00384	179.47	81.18	.08306	1.00154	.6883
280.	.4747	4210.6	.03811	.5518	.00357	186.71	85.39	.09432	1.00143	.6866
300.	.4431	4465.7	.03864	.5518	.00333	194.01	89.50	.10608	1.00134	.6855
350.	.3799	5134.9	.03939	.5516	.00285	212.60	99.42	.13759	1.00115	.6847
400.	.3325	5834.0	.03968	.5514	.00250	231.48	108.88	.17217	1.00100	.6847
450.	.2956	6553.1	.03975	.5513	.00222	250.31	117.96	.20971	1.00089	.6849
500.	.2661	7277.4	.03975	.5512	.00200	268.90	126.72	.25037	1.00080	.6846
550.	.2420	8008.7	.03971	.5511	.00181	287.14	135.19	.29389	1.00073	.6844
600.	.2219	8745.4	.03964	.5510	.00166	305.07	143.42	.34020	1.00067	.6841
700.	.1902	10239.9	.03942	.5509	.00143	340.21	159.24	.44083	1.00057	.6837
800.	.1665	11773.9	.03907	.5508	.00125	374.89	174.35	.55163	1.00050	.6836
900.	.1480	13358.2	.03860	.5507	.00111	409.63	188.90	.67220	1.00045	.6836
1000.	.1332	15000.1	.03803	.5506	.00100	444.72	202.95	.80216	1.00040	.6838
1200.	.1110	18458.5	.03672	.5505	.00083	511.14	229.87	1.07849	1.00033	.6911
1400.	.0952	22146.0	.03534	.5505	.00071	583.47	255.50	1.39631	1.00029	.6921
1600.	.0833	26007.0	.03406	.5504	.00062	656.89	280.05	1.74805	1.00025	.6925
1800.	.0740	30130.1	.03277	.5503	.00056	735.93	303.67	2.13907	1.00022	.6903
2000.	.0666	34949.0	.03102	.5501	.00050	837.11	326.45	2.58939	1.00020	.6813
2200.	.0605	41350.8	.02838	.5496	.00045	994.24	345.00	3.14482	1.00018	.6527
2400.	.0554	50882.1	.02464	.5484	.00042	1265.40	366.61	3.87073	1.00017	.6160
2600.	.0509	65766.3	.02019	.5458	.00039	1733.54	388.19	4.81448	1.00015	.5708
2800.	.0468	88700.8	.01583	.5407	.00036	2499.03	410.22	5.96769	1.00014	.5289
3000.	.0430	122366.2	.01217	.5322	.00034	3662.01	433.34	7.27649	1.00013	.4988

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.60 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.001	.01293	1.2078	.9302	-308.7	-300.9	4.980	4.70	6.38	1280.
15.	.01306	1.0920	.9281	-302.2	-294.3	5.437	4.90	6.92	1242.
16.	.01321	1.0321	.9095	-295.2	-287.2	5.894	5.10	7.33	1219.
17.	.01337	.9660	.8938	-287.7	-279.7	6.354	5.28	7.79	1194.
18.	.01354	.9027	.8790	-279.7	-271.6	6.814	5.44	8.27	1171.
19.	.01373	.8398	.8638	-271.3	-263.1	7.275	5.59	8.77	1148.
20.	.01393	.7755	.8468	-262.4	-254.0	7.739	5.72	9.31	1123.
21.	.01416	.7107	.8280	-252.9	-244.4	8.207	5.84	9.90	1098.
22.	.01440	.6428	.8069	-242.8	-234.2	8.683	5.93	10.56	1069.
23.	.01468	.5760	.7829	-232.1	-223.3	9.168	6.01	11.29	1040.
24.	.01499	.5082	.7545	-220.6	-211.6	9.666	6.08	12.12	1007.
25.	.01535	.4376	.7211	-208.2	-199.0	10.180	6.14	13.14	968.
26.	.01577	.3665	.6813	-194.7	-185.3	10.719	6.19	14.38	923.
27.	.01629	.2933	.6346	-179.9	-170.1	11.291	6.25	16.08	869.
28.	.01694	.2216	.5810	-163.1	-152.9	11.916	6.32	18.56	807.
* 28.123	.01704	.2190	.5735	-160.8	-150.6	11.999	6.34	18.60	802.
* 28.123	.13376	.0472	.0369	115.5	195.8	24.322	7.13	21.64	378.
29.	.14530	.0570	.0332	126.3	213.5	24.941	6.95	18.80	393.
30.	.15699	.0666	.0302	137.1	231.3	25.545	6.81	16.93	407.
31.	.16776	.0752	.0279	146.9	247.6	26.079	6.71	15.73	420.
32.	.17792	.0831	.0260	156.1	262.8	26.564	6.64	14.88	431.
33.	.18761	.0905	.0244	164.9	277.4	27.013	6.59	14.25	442.
34.	.19695	.0974	.0231	173.2	291.4	27.430	6.53	13.74	453.
36.	.21486	.1104	.0209	189.2	318.1	28.194	6.45	13.03	472.
38.	.23202	.1226	.0192	204.5	343.7	28.885	6.40	12.55	490.
40.	.24864	.1342	.0178	219.2	368.4	29.520	6.37	12.20	507.
42.	.26485	.1453	.0166	233.7	392.6	30.109	6.35	11.95	523.
44.	.28074	.1560	.0156	247.8	416.3	30.660	6.34	11.75	538.
46.	.29637	.1665	.0147	261.8	439.6	31.178	6.34	11.59	552.
48.	.31179	.1767	.0139	275.6	462.7	31.669	6.35	11.47	565.
50.	.32704	.1867	.0132	289.3	485.5	32.135	6.35	11.38	578.
52.	.34214	.1965	.0126	302.9	508.2	32.580	6.38	11.31	590.
56.	.37198	.2158	.0115	330.1	553.3	33.416	6.45	11.24	613.
60.	.40143	.2346	.0107	357.3	598.2	34.190	6.55	11.23	634.
65.	.43784	.2576	.0097	391.8	654.5	35.092	6.73	11.31	658.
70.	.47391	.2802	.0090	427.1	711.5	35.936	6.97	11.48	679.
75.	.50972	.3025	.0083	463.6	769.5	36.736	7.27	11.72	698.
80.	.54533	.3246	.0078	501.6	828.8	37.502	7.62	12.03	716.
90.	.61608	.3682	.0068	583.0	952.7	38.960	8.42	12.76	747.
100.	.68639	.4113	.0061	672.5	1084.4	40.347	9.29	13.58	776.
110.	.75637	.4541	.0055	770.4	1224.2	41.677	10.12	14.38	803.
120.	.82612	.4965	.0051	875.9	1371.6	42.959	10.84	15.07	831.
130.	.89570	.5387	.0047	987.8	1525.2	44.189	11.41	15.53	859.
140.	.96515	.5808	.0043	1104.6	1683.7	45.362	11.83	16.03	887.
160.	1.10375	.6646	.0038	1346.6	2008.9	47.533	12.22	16.40	945.
180.	1.24207	.7481	.0034	1591.8	2337.0	49.466	12.19	16.36	1002.
200.	1.38020	.8314	.0030	1833.8	2661.9	51.177	11.95	16.11	1059.
220.	1.51820	.9145	.0027	2070.0	2980.9	52.698	11.64	15.79	1114.
240.	1.65609	.9975	.0025	2299.9	3293.5	54.058	11.33	15.48	1167.
260.	1.79391	1.0804	.0023	2524.1	3600.4	55.286	11.08	15.22	1218.
280.	1.93167	1.1632	.0021	2743.7	3902.7	56.407	10.88	15.01	1267.
300.	2.06928	1.2459	.0020	2959.9	4201.4	57.438	10.72	14.86	1314.
350.	2.41338	1.4526	.0017	3490.2	4938.2	59.708	10.51	14.64	1423.
400.	2.75734	1.6592	.0015	4013.5	5667.9	61.658	10.43	14.56	1522.
450.	3.10122	1.8656	.0013	4533.9	6394.6	63.371	10.41	14.53	1614.
500.	3.44506	2.0720	.0012	5054.4	7121.4	64.901	10.40	14.53	1701.
550.	3.78885	2.2783	.0011	5574.4	7847.8	66.286	10.41	14.54	1784.
600.	4.13262	2.4847	.0010	6095.5	8575.1	67.550	10.43	14.55	1862.
700.	4.82011	2.8972	.0009	7140.5	10032.6	69.798	10.48	14.61	2009.
800.	5.50756	3.3097	.0008	8193.1	11497.6	71.753	10.57	14.70	2145.
900.	6.19499	3.7222	.0007	9256.5	12973.5	73.490	10.70	14.82	2271.
1000.	6.88239	4.1347	.0006	10333.7	14463.2	75.062	10.86	14.98	2389.
1200.	8.25718	4.9596	.0005	12544.0	17498.3	77.816	11.24	15.37	2604.
1400.	9.63195	5.7845	.0004	14836.8	20615.9	80.223	11.63	15.81	2798.
1600.	11.00681	6.6094	.0004	17216.9	23821.0	82.339	12.12	16.24	2977.
1800.	12.38234	7.4342	.0003	19692.0	27121.4	84.245	12.59	16.72	3142.
2000.	13.76076	8.2591	.0003	22290.0	30546.5	86.115	13.28	17.45	3293.
2200.	15.14840	9.0839	.0003	25074.8	34163.8	88.510	14.50	18.74	3427.
2400.	16.55955	9.9088	.0003	28201.7	38137.4	91.284	16.66	21.11	3542.
2600.	18.02131	10.7336	.0002	31928.3	42741.1	94.428	20.31	25.17	3645.
2800.	19.57860	11.5584	.0002	36635.7	48382.9	97.912	26.00	31.52	3747.
3000.	21.29856	12.3833	.0002	42830.8	55610.0	101.702	34.18	41.14	3857.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.60 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)/V_P$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.001	77.3529	640.6	.25573	93.4243	.00996	75.07	258.50	.00055	1.25276	2.1963
15.	76.5504	623.6	.24723	83.5919	.01110	83.73	227.26	.00057	1.24994	1.8790
16.	75.7022	630.0	.23579	78.1349	.01164	89.81	202.51	.00058	1.24696	1.6534
17.	74.7902	629.7	.22649	72.2485	.01237	93.84	182.26	.00058	1.24376	1.5130
18.	73.8345	627.0	.21873	66.6472	.01319	96.71	165.61	.00057	1.24041	1.4160
19.	72.8306	621.3	.21212	61.1633	.01412	98.41	151.65	.00055	1.23691	1.3522
20.	71.7697	612.1	.20621	55.6607	.01521	99.92	139.71	.00054	1.23321	1.3020
21.	70.6402	600.0	.20087	50.2035	.01649	101.66	129.23	.00052	1.22928	1.2585
22.	69.4268	583.9	.19588	44.6299	.01808	102.62	120.02	.00050	1.22506	1.2345
23.	68.1216	565.8	.19108	39.2410	.01995	102.89	111.66	.00048	1.22054	1.2249
24.	66.7023	544.7	.18601	33.8976	.02226	102.51	103.99	.00046	1.21563	1.2298
25.	65.1405	519.3	.18040	28.5044	.02530	101.48	96.80	.00043	1.21025	1.2531
26.	63.3921	490.4	.17372	23.2325	.02933	99.75	89.93	.00039	1.20424	1.2967
27.	61.3956	456.4	.16546	18.0098	.03524	97.28	83.19	.00035	1.19741	1.3751
28.	59.0308	417.9	.15564	13.0801	.04442	93.92	76.36	.00031	1.18935	1.5092
* 28.123	58.6975	416.7	.15422	12.8519	.04462	93.42	75.48	.00031	1.18821	1.5024
* 28.123	7.4761	207.0	.06917	.3528	.10454	30.27	17.01	.00067	1.02271	1.2160
29.	6.8825	222.0	.06951	.3925	.08467	29.46	17.28	.00082	1.02089	1.1027
30.	6.3700	238.0	.06964	.4245	.07115	29.18	17.64	.00097	1.01933	1.0232
31.	5.9608	253.0	.06965	.4484	.06216	29.32	18.02	.00113	1.01808	.9662
32.	5.6207	267.4	.06962	.4671	.05565	29.62	18.41	.00128	1.01704	.9249
33.	5.3301	281.3	.06951	.4822	.05064	30.00	18.81	.00142	1.01615	.8935
34.	5.0773	294.5	.06964	.4946	.04667	30.43	19.22	.00157	1.01538	.8682
36.	4.6542	320.2	.06970	.5140	.04069	31.43	20.05	.00187	1.01409	.8312
38.	4.3100	345.4	.06962	.5285	.03633	32.53	20.87	.00216	1.01305	.8053
40.	4.0220	370.1	.06946	.5397	.03297	33.69	21.69	.00247	1.01217	.7857
42.	3.7758	394.5	.06926	.5486	.03028	34.89	22.51	.00279	1.01142	.7705
44.	3.5621	418.7	.06902	.5558	.02806	36.12	23.31	.00311	1.01077	.7581
46.	3.3742	442.7	.06874	.5617	.02619	37.38	24.11	.00344	1.01020	.7478
48.	3.2072	466.7	.06843	.5667	.02458	38.65	24.90	.00378	1.00970	.7391
50.	3.0577	490.7	.06807	.5708	.02319	39.93	25.67	.00413	1.00924	.7317
52.	2.9228	515.0	.06766	.5744	.02197	41.23	26.44	.00449	1.00883	.7256
56.	2.6883	564.4	.06663	.5800	.01991	43.85	27.95	.00523	1.00812	.7162
60.	2.4911	615.7	.06534	.5843	.01824	46.56	29.42	.00599	1.00753	.7096
65.	2.2839	683.8	.06333	.5883	.01655	50.29	31.21	.00701	1.00690	.7020
70.	2.1101	757.3	.06094	.5913	.01516	54.04	32.94	.00803	1.00637	.6999
75.	1.9618	837.0	.05828	.5935	.01401	57.71	34.63	.00903	1.00592	.7036
80.	1.8338	923.3	.05549	.5953	.01303	61.54	36.28	.01005	1.00554	.7091
90.	1.6232	1115.4	.05002	.5977	.01144	71.35	39.46	.01240	1.00490	.7059
100.	1.4569	1329.1	.04526	.5993	.01022	81.18	42.51	.01477	1.00440	.7111
110.	1.3221	1556.7	.04145	.6003	.00924	92.67	44.85	.01755	1.00399	.6958
120.	1.2105	1787.9	.03862	.6010	.00843	103.25	47.67	.02037	1.00365	.6960
130.	1.1164	2014.1	.03663	.6015	.00776	113.25	50.41	.02337	1.00337	.6957
140.	1.0361	2229.8	.03530	.6018	.00719	122.16	53.07	.02648	1.00313	.6964
160.	.9060	2615.2	.03411	.6022	.00627	136.67	58.20	.03311	1.00273	.6984
180.	.8051	2940.6	.03414	.6023	.00556	147.79	63.11	.04039	1.00243	.6987
200.	.7245	3221.1	.03479	.6024	.00500	156.85	67.84	.04838	1.00218	.6968
220.	.6587	3475.5	.03570	.6024	.00454	164.80	72.42	.05705	1.00199	.6938
240.	.6038	3719.3	.03663	.6023	.00416	172.23	76.86	.06634	1.00182	.6908
260.	.5574	3963.1	.03746	.6022	.00384	179.48	81.18	.07616	1.00168	.6884
280.	.5177	4211.6	.03813	.6022	.00357	186.72	85.39	.08648	1.00156	.6867
300.	.4833	4466.8	.03865	.6021	.00333	194.02	89.51	.09727	1.00146	.6855
350.	.4144	5136.1	.03940	.6019	.00285	212.61	99.42	.12615	1.00125	.6847
400.	.3627	5835.3	.03970	.6017	.00249	231.49	108.88	.15786	1.00109	.6847
450.	.3225	6554.5	.03976	.6016	.00222	250.32	117.96	.19228	1.00097	.6849
500.	.2903	7278.8	.03976	.6014	.00200	268.90	126.72	.22955	1.00087	.6846
550.	.2639	8010.2	.03972	.6013	.00181	287.15	135.19	.26945	1.00080	.6844
600.	.2420	8746.8	.03965	.6012	.00166	305.08	143.42	.31191	1.00073	.6841
700.	.2075	10241.4	.03942	.6011	.00143	340.21	159.24	.40416	1.00063	.6837
800.	.1816	11775.4	.03907	.6009	.00125	374.89	174.35	.50573	1.00055	.6836
900.	.1614	13359.7	.03860	.6008	.00111	409.63	188.90	.61626	1.00049	.6836
1000.	.1453	15031.7	.03803	.6008	.00100	444.72	202.95	.73540	1.00044	.6838
1200.	.1211	18460.1	.03672	.6006	.00083	511.13	229.87	.98870	1.00036	.6911
1400.	.1038	22147.5	.03534	.6006	.00071	583.46	255.50	1.28004	1.00031	.6921
1600.	.0909	26006.8	.03407	.6005	.00062	656.81	280.05	1.60242	1.00027	.6925
1800.	.0808	30120.9	.03279	.6004	.00056	735.50	303.67	1.96050	1.00024	.6905
2000.	.0727	34905.7	.03108	.6002	.00050	835.37	326.45	2.37186	1.00022	.6818
2200.	.0660	41210.3	.02850	.5997	.00045	988.79	344.93	2.87701	1.00020	.6539
2400.	.0604	50515.8	.02485	.5984	.00042	1251.40	366.59	3.53468	1.00018	.6183
2600.	.0555	64953.8	.02047	.5956	.00039	1702.74	388.13	4.38948	1.00017	.5737
2800.	.0511	87118.5	.01614	.5904	.00036	2439.38	410.10	5.43720	1.00015	.5316
3000.	.0470	119609.2	.01246	.5814	.00034	3558.42	433.10	6.63130	1.00014	.5008

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.65 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.018	.01292	1.2111	.9307	-308.7	-300.3	4.981	4.70	6.38	1281.
15.	.01306	1.0970	.9298	-302.3	-293.8	5.430	4.90	6.92	1244.
16.	.01320	1.0374	.9110	-295.3	-286.7	5.887	5.09	7.32	1221.
17.	.01336	.9711	.8953	-287.8	-279.1	6.346	5.27	7.78	1197.
18.	.01353	.9076	.8805	-279.9	-271.1	6.805	5.44	8.26	1174.
19.	.01372	.8449	.8653	-271.5	-262.6	7.265	5.59	8.76	1151.
20.	.01392	.7806	.8484	-262.6	-253.6	7.728	5.72	9.29	1126.
21.	.01414	.7160	.8297	-253.2	-244.0	8.196	5.83	9.87	1101.
22.	.01439	.6480	.8086	-243.1	-233.8	8.670	5.93	10.53	1072.
23.	.01466	.5816	.7848	-232.4	-222.9	9.154	6.01	11.25	1043.
24.	.01497	.5141	.7567	-221.0	-211.3	9.649	6.08	12.07	1010.
25.	.01533	.4437	.7237	-208.7	-196.7	10.161	6.13	13.06	972.
26.	.01574	.3746	.6847	-195.3	-185.1	10.696	6.19	14.25	929.
27.	.01624	.3029	.6389	-180.7	-170.1	11.261	6.24	15.84	877.
28.	.01688	.2291	.5862	-164.1	-153.1	11.879	6.32	18.28	814.
* 28.583	.01734	.1892	.5511	-153.2	-141.9	12.275	6.37	20.18	774.
* 28.583	.12221	.0443	.0409	113.3	192.8	23.990	7.20	23.32	378.
29.	.12786	.0495	.0386	119.1	202.2	24.317	7.09	21.34	386.
30.	.13972	.0604	.0345	131.2	222.0	24.987	6.91	18.46	402.
31.	.15037	.0698	.0315	141.8	239.5	25.563	6.80	16.78	415.
32.	.16025	.0783	.0292	151.6	255.7	26.077	6.71	15.56	428.
33.	.16959	.0861	.0273	160.8	271.0	26.548	6.64	14.86	439.
34.	.17853	.0934	.0257	169.5	285.5	26.982	6.57	14.24	450.
36.	.19554	.1070	.0232	186.0	313.1	27.769	6.47	13.38	470.
38.	.21174	.1196	.0212	201.6	339.2	28.476	6.42	12.81	489.
40.	.22736	.1315	.0196	216.7	364.4	29.123	6.38	12.41	506.
42.	.24256	.1429	.0182	231.3	389.0	29.721	6.36	12.12	522.
44.	.25742	.1539	.0171	245.6	412.9	30.279	6.35	11.89	537.
46.	.27202	.1646	.0161	259.7	436.5	30.803	6.35	11.71	551.
48.	.28640	.1749	.0152	273.7	459.8	31.299	6.36	11.58	565.
50.	.30060	.1851	.0145	287.5	482.9	31.770	6.37	11.47	577.
52.	.31465	.1951	.0138	301.2	505.8	32.218	6.39	11.40	590.
56.	.34238	.2145	.0126	328.6	551.1	33.059	6.45	11.30	613.
60.	.36972	.2335	.0116	356.0	596.3	33.838	6.55	11.29	634.
65.	.40350	.2568	.0106	390.6	652.9	34.744	6.73	11.36	658.
70.	.43692	.2796	.0097	426.0	710.0	35.591	6.98	11.52	679.
75.	.47009	.3020	.0090	462.6	768.2	36.393	7.27	11.75	699.
80.	.50305	.3242	.0084	500.7	827.7	37.161	7.62	12.05	716.
90.	.56851	.3680	.0074	582.2	951.8	38.621	8.43	12.78	747.
100.	.63353	.4113	.0066	671.8	1083.6	40.010	9.29	13.60	776.
110.	.69822	.4541	.0060	769.8	1223.6	41.341	10.12	14.39	804.
120.	.76268	.4967	.0055	875.4	1371.1	42.625	10.84	15.09	831.
130.	.82697	.5390	.0051	987.3	1524.8	43.855	11.41	15.64	859.
140.	.89113	.5811	.0047	1104.1	1683.4	45.029	11.83	16.04	888.
160.	1.01915	.6651	.0041	1346.2	2008.7	47.201	12.22	16.41	945.
180.	1.14690	.7486	.0036	1591.4	2336.9	49.134	12.19	16.36	1002.
200.	1.27445	.8319	.0033	1833.5	2661.9	50.846	11.95	16.11	1059.
220.	1.40187	.9151	.0030	2069.7	2981.0	52.367	11.64	15.79	1114.
240.	1.52919	.9981	.0027	2299.6	3293.6	53.727	11.33	15.48	1168.
260.	1.65643	1.0810	.0025	2523.9	3600.6	54.956	11.08	15.22	1219.
280.	1.78362	1.1639	.0023	2743.5	3902.9	56.076	10.88	15.02	1268.
300.	1.91066	1.2466	.0022	2959.7	4201.6	57.107	10.72	14.86	1314.
350.	2.22832	1.4534	.0019	3490.1	4938.5	59.378	10.51	14.64	1423.
400.	2.54585	1.6600	.0016	4013.4	5668.2	61.328	10.43	14.56	1522.
450.	2.86329	1.8664	.0014	4533.8	6395.0	63.041	10.41	14.54	1615.
500.	3.18069	2.0728	.0013	5054.3	7121.8	64.571	10.40	14.53	1702.
550.	3.49805	2.2792	.0012	5574.4	7848.1	65.956	10.41	14.54	1784.
600.	3.81538	2.4855	.0011	6095.4	8575.4	67.220	10.43	14.55	1863.
700.	4.45000	2.8981	.0009	7140.5	10033.0	69.468	10.48	14.61	2010.
800.	5.08457	3.3106	.0008	8193.1	11498.0	71.423	10.57	14.70	2145.
900.	5.71912	3.7231	.0007	9256.5	12973.9	73.160	10.70	14.82	2271.
1000.	6.35365	4.1356	.0007	10333.7	14463.6	74.732	10.86	14.98	2389.
1200.	7.62269	4.9605	.0005	12544.0	17498.7	77.486	11.24	15.37	2604.
1400.	8.89171	5.7854	.0005	14836.7	20616.4	79.892	11.68	15.81	2798.
1600.	10.16081	6.6102	.0004	17216.8	23821.3	82.009	12.11	16.24	2977.
1800.	11.43050	7.4351	.0004	19691.4	27121.2	83.915	12.58	16.72	3143.
2000.	12.70276	8.2600	.0003	22287.2	30544.0	85.783	13.27	17.43	3294.
2200.	13.98319	9.0848	.0003	25064.9	34154.0	88.175	14.44	18.68	3428.
2400.	15.28448	9.9096	.0003	28174.0	38108.9	90.941	16.54	20.97	3544.
2600.	16.63065	10.7345	.0003	31861.5	42671.4	94.068	20.06	24.88	3648.
2800.	18.06156	11.5593	.0002	36493.4	48233.4	97.523	25.53	31.09	3749.
3000.	19.63675	12.3842	.0002	42556.9	55320.8	101.265	33.41	40.25	3858.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.65 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	14.018	77.3811	642.3	.25567	93.7175	.00993	75.28	258.81	.00055	1.25286	2.1932
	15.	76.5945	625.1	.24760	84.0224	.01107	83.79	228.04	.00057	1.25009	1.8828
	16.	75.7493	631.8	.23611	78.5805	.01159	89.89	203.19	.00058	1.24712	1.6557
	17.	74.8411	631.5	.22680	72.6747	.01232	93.93	182.88	.00058	1.24394	1.5146
	18.	73.8894	628.9	.21903	67.0624	.01313	96.82	166.17	.00057	1.24061	1.4171
	19.	72.8896	623.3	.21240	61.5851	.01405	98.53	152.16	.00056	1.23711	1.3526
	20.	71.8334	614.3	.20650	56.0762	.01513	100.06	140.19	.00054	1.23343	1.3020
	21.	70.7100	602.4	.20115	50.6302	.01639	101.83	129.74	.00053	1.22952	1.2578
	22.	69.5037	586.3	.19614	45.0414	.01795	102.81	120.45	.00051	1.22533	1.2333
	23.	68.2080	568.6	.19135	39.6701	.01978	103.10	112.09	.00048	1.22084	1.2228
	24.	66.8000	547.8	.18632	34.3438	.02203	102.74	104.42	.00046	1.21597	1.2266
	25.	65.2529	522.7	.18078	28.9546	.02499	101.75	97.24	.00043	1.21064	1.2485
	26.	63.5279	495.2	.17423	23.8007	.02877	100.07	90.40	.00040	1.20471	1.2869
	27.	61.5732	462.4	.16621	18.6516	.03426	97.70	83.73	.00036	1.19802	1.3577
	28.	59.2493	423.3	.15662	13.5744	.04319	94.41	76.94	.00031	1.19009	1.4899
*	28.583	57.6537	399.3	.14999	10.9068	.05053	91.98	72.83	.00028	1.18467	1.5976
*	28.583	8.1825	206.6	.06934	.3622	.11285	31.70	17.47	.00060	1.02487	1.2848
	29.	7.8212	214.3	.06954	.3875	.09957	31.01	17.57	.00067	1.02377	1.2086
	30.	7.1571	231.3	.06975	.4324	.07982	30.23	17.87	.00082	1.02173	1.0913
	31.	6.6503	247.1	.06980	.4644	.06792	30.14	18.21	.00097	1.02018	1.0142
	32.	6.2403	262.0	.06979	.4886	.05979	30.30	18.59	.00112	1.01893	.9609
	33.	5.8964	276.4	.06969	.5078	.05376	30.58	18.97	.00126	1.01788	.9218
	34.	5.6013	289.8	.06987	.5234	.04912	30.95	19.37	.00140	1.01698	.8910
	36.	5.1140	316.1	.06997	.5474	.04232	31.86	20.17	.00168	1.01549	.8471
	38.	4.7228	341.6	.06989	.5650	.03750	32.90	20.99	.00196	1.01430	.8171
	40.	4.3983	366.7	.06973	.5786	.03384	34.03	21.80	.00224	1.01332	.7950
	42.	4.1228	391.4	.06951	.5893	.03095	35.20	22.60	.00254	1.01248	.7780
	44.	3.8847	415.8	.06926	.5979	.02859	36.40	23.40	.00284	1.01175	.7643
	46.	3.6762	440.1	.06897	.6049	.02662	37.64	24.19	.00315	1.01112	.7530
	48.	3.4916	464.3	.06865	.6108	.02494	38.89	24.97	.00346	1.01056	.7436
	50.	3.3267	488.5	.06827	.6158	.02349	40.16	25.75	.00379	1.01006	.7356
	52.	3.1781	512.9	.06785	.6200	.02222	41.44	26.51	.00412	1.00961	.7290
	56.	2.9207	562.6	.06680	.6266	.02009	44.05	28.01	.00480	1.00883	.7189
	60.	2.7047	614.1	.06550	.6317	.01838	46.75	29.48	.00551	1.00817	.7118
	65.	2.4783	682.4	.06347	.6364	.01665	50.46	31.26	.00645	1.00749	.7036
	70.	2.2887	756.0	.06106	.6398	.01524	54.20	32.99	.00740	1.00691	.7012
	75.	2.1273	835.8	.05839	.6425	.01406	57.85	34.68	.00833	1.00642	.7047
	80.	1.9879	922.2	.05559	.6445	.01307	61.67	36.33	.00927	1.00600	.7100
	90.	1.7590	1114.5	.05010	.6474	.01147	71.47	39.50	.01144	1.00531	.7065
	100.	1.5785	1328.3	.04533	.6492	.01024	81.29	42.54	.01364	1.00476	.7116
	110.	1.4322	1556.1	.04150	.6504	.00925	92.72	44.86	.01620	1.00432	.6962
	120.	1.3112	1787.4	.03867	.6512	.00844	103.30	47.68	.01880	1.00396	.6963
	130.	1.2092	2013.9	.03667	.6518	.00777	113.30	50.42	.02157	1.00365	.6959
	140.	1.1222	2229.7	.03534	.6521	.00719	122.20	53.08	.02444	1.00339	.6966
	160.	.9812	2615.4	.03414	.6526	.00627	136.70	58.21	.03057	1.00296	.6986
	180.	.8719	2941.0	.03416	.6527	.00556	147.82	63.12	.03729	1.00263	.6988
	200.	.7847	3221.8	.03481	.6528	.00500	156.87	67.85	.04467	1.00237	.6969
	220.	.7133	3476.3	.03572	.6528	.00454	164.82	72.42	.05268	1.00215	.6939
	240.	.6539	3720.2	.03665	.6527	.00416	172.25	76.86	.06125	1.00197	.6908
	260.	.6037	3964.1	.03747	.6526	.00384	179.50	81.18	.07032	1.00182	.6884
	280.	.5607	4212.7	.03815	.6525	.00356	186.73	85.39	.07985	1.00169	.6867
	300.	.5234	4468.0	.03867	.6525	.00333	194.03	89.51	.08981	1.00158	.6856
	350.	.4488	5137.4	.03941	.6522	.00285	212.62	99.42	.11648	1.00135	.6848
	400.	.3928	5836.7	.03971	.6520	.00249	231.50	108.88	.14575	1.00118	.6847
	450.	.3492	6555.8	.03977	.6518	.00222	250.33	117.96	.17752	1.00105	.6850
	500.	.3144	7280.2	.03977	.6517	.00200	268.91	126.72	.21193	1.00095	.6846
	550.	.2859	8011.6	.03973	.6516	.00181	287.16	135.19	.24876	1.00086	.6844
	600.	.2621	8748.3	.03966	.6514	.00166	305.08	143.42	.28796	1.00079	.6841
	700.	.2247	10242.9	.03943	.6513	.00143	340.21	159.24	.37313	1.00068	.6837
	800.	.1967	11776.9	.03908	.6511	.00125	374.90	174.36	.46689	1.00059	.6836
	900.	.1749	13361.2	.03861	.6510	.00111	409.63	188.90	.56892	1.00053	.6836
	1000.	.1574	15003.2	.03804	.6509	.00100	444.73	202.95	.67890	1.00047	.6838
	1200.	.1312	18461.7	.03673	.6508	.00083	511.13	229.87	.91273	1.00040	.6911
	1400.	.1125	22149.0	.03534	.6506	.00071	583.46	255.50	1.18166	1.00034	.6921
	1600.	.0984	26006.9	.03407	.6506	.00062	656.75	280.05	1.47920	1.00030	.6925
	1800.	.0875	30113.0	.03280	.6505	.00056	735.12	303.67	1.80945	1.00026	.6906
	2000.	.0787	34867.7	.03112	.6502	.00050	833.83	326.45	2.18800	1.00024	.6823
	2200.	.0715	41086.5	.02860	.6497	.00045	983.98	344.99	2.65100	1.00022	.6551
	2400.	.0654	50192.7	.02503	.6483	.00042	1239.05	366.57	3.25166	1.00020	.6203
	2600.	.0601	64236.7	.02073	.6455	.00039	1675.56	388.09	4.03198	1.00018	.5763
	2800.	.0554	85720.6	.01642	.6400	.00036	2386.66	410.00	4.99096	1.00017	.5341
	3000.	.0509	117169.7	.01273	.6307	.00034	3466.74	432.89	6.08809	1.00015	.5027

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.70 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	14.034	.01292	1.2145	.9313	-308.7	-299.6	4.983	4.71	6.38	1283.
	15.	.01305	1.1212	.9307	-302.4	-293.2	5.423	4.90	6.88	1254.
	16.	.01319	1.0426	.9125	-295.4	-286.2	5.879	5.09	7.32	1224.
	17.	.01335	.9761	.8968	-287.9	-278.6	6.338	5.27	7.77	1199.
	18.	.01352	.9125	.8820	-280.0	-270.6	6.796	5.44	8.24	1176.
	19.	.01371	.8500	.8668	-271.7	-262.1	7.256	5.59	8.74	1153.
	20.	.01391	.7857	.8500	-262.8	-253.1	7.718	5.72	9.28	1129.
	21.	.01413	.7213	.8313	-253.4	-243.5	8.184	5.83	9.85	1104.
	22.	.01437	.6554	.8104	-243.4	-233.4	8.657	5.93	10.48	1076.
	23.	.01464	.5871	.7866	-232.7	-222.5	9.139	6.01	11.21	1046.
	24.	.01495	.5200	.7588	-221.4	-210.9	9.633	6.08	12.02	1014.
	25.	.01530	.4498	.7262	-209.1	-198.4	10.142	6.13	13.00	976.
	26.	.01571	.3816	.6878	-195.9	-184.9	10.673	6.18	14.14	934.
	27.	.01620	.3102	.6429	-181.4	-170.0	11.234	6.24	15.68	883.
	28.	.01682	.2364	.5913	-165.0	-153.2	11.844	6.31	18.03	822.
	29.	.01765	.1660	.5302	-145.9	-133.6	12.533	6.41	21.71	750.
*	29.019	.01767	.1659	.5291	-145.6	-133.2	12.546	6.41	21.70	749.
*	29.019	.11211	.0412	.0451	110.8	189.3	23.666	7.28	25.29	378.
	30.	.12448	.0537	.0395	124.6	211.7	24.425	7.04	20.53	396.
	31.	.13519	.0641	.0356	136.3	230.9	25.055	6.89	18.10	411.
	32.	.14493	.0733	.0327	146.7	248.2	25.604	6.78	16.59	424.
	33.	.15402	.0817	.0304	156.5	264.3	26.099	6.70	15.56	435.
	34.	.16265	.0894	.0285	165.6	279.4	26.552	6.61	14.79	447.
	36.	.17893	.1036	.0255	182.6	307.9	27.365	6.50	13.75	468.
	38.	.19432	.1166	.0232	198.7	334.7	28.090	6.44	13.09	487.
	40.	.20911	.1289	.0214	214.0	360.4	28.749	6.40	12.63	504.
	42.	.22344	.1406	.0199	228.9	385.3	29.357	6.38	12.29	521.
	44.	.23742	.1518	.0186	243.4	409.6	29.922	6.35	12.04	536.
	46.	.25114	.1626	.0175	257.7	433.5	30.453	6.35	11.84	550.
	48.	.26463	.1732	.0166	271.8	457.0	30.953	6.36	11.69	564.
	50.	.27793	.1835	.0157	285.7	480.3	31.428	6.38	11.57	577.
	52.	.29109	.1936	.0149	299.5	503.3	31.880	6.40	11.48	590.
	56.	.31701	.2133	.0136	327.1	549.0	32.726	6.46	11.37	613.
	60.	.34255	.2325	.0126	354.6	594.4	33.510	6.56	11.34	634.
	65.	.37406	.2560	.0115	389.4	651.2	34.419	6.74	11.40	658.
	70.	.40522	.2789	.0105	424.9	708.6	35.269	6.98	11.55	680.
	75.	.43612	.3015	.0098	461.6	766.9	36.074	7.28	11.78	699.
	80.	.46681	.3238	.0091	499.8	826.5	36.844	7.62	12.08	716.
	90.	.52774	.3678	.0080	581.4	950.8	38.307	8.43	12.80	748.
	100.	.58822	.4112	.0072	671.1	1082.9	39.697	9.29	13.51	776.
	110.	.64838	.4542	.0065	769.2	1223.0	41.030	10.12	14.40	804.
	120.	.70831	.4968	.0059	874.8	1370.6	42.314	10.84	15.10	832.
	130.	.76806	.5392	.0055	986.8	1524.5	43.545	11.41	15.65	860.
	140.	.82769	.5814	.0051	1103.7	1683.0	44.720	11.83	16.05	888.
	160.	.94664	.6655	.0044	1345.8	2008.5	46.893	12.22	16.41	945.
	180.	1.06532	.7491	.0039	1591.1	2336.8	48.827	12.19	16.37	1003.
	200.	1.18381	.8325	.0035	1833.2	2661.9	50.539	11.95	16.12	1059.
	220.	1.30216	.9157	.0032	2069.5	2981.0	52.060	11.64	15.79	1115.
	240.	1.42041	.9988	.0029	2299.4	3293.7	53.420	11.33	15.48	1168.
	260.	1.53859	1.0817	.0027	2523.7	3600.7	54.649	11.08	15.22	1219.
	280.	1.65671	1.1646	.0025	2743.3	3903.0	55.770	10.88	15.02	1268.
	300.	1.77470	1.2474	.0023	2959.6	4201.8	56.801	10.72	14.86	1315.
	350.	2.06970	1.4541	.0020	3489.9	4938.7	59.072	10.51	14.64	1423.
	400.	2.36456	1.6607	.0018	4013.3	5668.5	61.022	10.43	14.56	1523.
	450.	2.65935	1.8672	.0016	4533.7	6395.3	62.735	10.41	14.54	1615.
	500.	2.95408	2.0737	.0014	5054.2	7122.1	64.265	10.40	14.53	1702.
	550.	3.24878	2.2800	.0013	5574.3	7848.5	65.650	10.41	14.54	1784.
	600.	3.54346	2.4863	.0012	6095.4	8575.8	66.914	10.43	14.55	1863.
	700.	4.13275	2.8989	.0010	7140.5	10033.4	69.162	10.48	14.61	2010.
	800.	4.72201	3.3115	.0009	8193.0	11498.4	71.117	10.57	14.70	2146.
	900.	5.31123	3.7240	.0008	9256.4	12974.3	72.854	10.70	14.82	2271.
	1000.	5.90045	4.1365	.0007	10333.7	14464.0	74.426	10.86	14.98	2389.
	1200.	7.07884	4.9614	.0006	12544.0	17499.2	77.180	11.24	15.37	2604.
	1400.	8.25722	5.7863	.0005	14836.7	20616.8	79.587	11.68	15.81	2798.
	1600.	9.43567	6.6111	.0004	17216.7	23821.7	81.704	12.11	16.24	2977.
	1800.	10.61465	7.4360	.0004	19690.8	27121.1	83.609	12.58	16.71	3143.
	2000.	11.79592	8.2608	.0004	22284.7	30541.8	85.476	13.25	17.41	3295.
	2200.	12.98451	9.0857	.0003	25056.2	34145.3	87.865	14.40	18.63	3429.
	2400.	14.19176	9.9105	.0003	28149.2	38083.5	90.623	16.42	20.84	3546.
	2600.	15.43917	10.7354	.0003	31801.9	42609.3	93.736	19.83	24.62	3650.
	2800.	16.76242	11.5602	.0003	36366.6	48100.3	97.165	25.12	30.62	3752.
	3000.	18.21479	12.3851	.0002	42312.9	55063.2	100.864	32.73	39.46	3860.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.70 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)/V_P$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	14.034	77.4091	644.0	.25560	94.0105	.00991	75.48	259.12	.00055	1.25296	2.1901
	15.	76.6375	634.7	.24774	85.9246	.01083	83.85	228.80	.00057	1.25024	1.8761
	16.	75.7962	633.6	.23643	79.0247	.01155	89.96	203.88	.00058	1.24729	1.6580
	17.	74.8918	633.3	.22711	73.0991	.01227	94.03	183.49	.00058	1.24412	1.5163
	18.	73.9440	630.7	.21933	67.4756	.01307	96.93	166.73	.00057	1.24080	1.4182
	19.	72.9482	625.4	.21269	62.0050	.01398	98.66	152.68	.00056	1.23732	1.3530
	20.	71.8967	616.4	.20678	56.4899	.01505	100.21	140.66	.00054	1.23365	1.3020
	21.	70.7792	604.8	.20142	51.0545	.01628	101.99	130.19	.00053	1.22976	1.2571
	22.	69.5856	589.9	.19642	45.6088	.01777	103.00	120.92	.00051	1.22561	1.2306
	23.	68.2935	571.3	.19162	40.0958	.01962	103.31	112.52	.00049	1.22113	1.2208
	24.	66.8966	550.9	.18662	34.7861	.02181	102.98	104.85	.00046	1.21630	1.2235
	25.	65.3638	526.1	.18114	29.4004	.02470	102.02	97.68	.00043	1.21102	1.2442
	26.	63.6599	499.3	.17471	24.2906	.02832	100.38	90.86	.00040	1.20516	1.2796
	27.	61.7337	467.0	.16688	19.1479	.03357	98.07	84.23	.00036	1.19857	1.3467
	28.	59.4604	428.5	.15755	14.0551	.04207	94.89	77.51	.00032	1.19081	1.4724
	29.	56.6553	385.1	.14604	9.4056	.05638	90.57	70.44	.00027	1.18129	1.6885
*	29.019	56.5997	385.0	.14582	9.3871	.05636	90.49	70.31	.00027	1.18110	1.6862
*	29.019	8.9195	206.1	.06948	.3678	.12267	33.25	17.94	.00053	1.02714	1.3638
	30.	8.0336	224.4	.06982	.4315	.09151	31.56	18.14	.00069	1.02442	1.1802
	31.	7.3969	241.0	.06993	.4744	.07508	31.10	18.44	.00084	1.02247	1.0728
	32.	6.8999	256.6	.06995	.5059	.06468	31.07	18.78	.00098	1.02095	1.0031
	33.	6.4925	271.4	.06985	.5302	.05733	31.23	19.15	.00111	1.01970	.9539
	34.	6.1483	285.2	.07008	.5496	.05186	31.51	19.53	.00125	1.01865	.9163
	36.	5.5888	311.9	.07024	.5789	.04409	32.31	20.31	.00151	1.01694	.8643
	38.	5.1461	337.9	.07017	.6002	.03873	33.29	21.10	.00178	1.01559	.8297
	40.	4.7823	363.3	.07000	.6164	.03476	34.37	21.90	.00205	1.01448	.8047
	42.	4.4755	388.3	.06977	.6291	.03165	35.51	22.70	.00232	1.01355	.7858
	44.	4.2119	413.0	.06951	.6393	.02914	36.69	23.49	.00261	1.01275	.7708
	46.	3.9819	437.5	.06920	.6476	.02706	37.90	24.28	.00289	1.01205	.7584
	48.	3.7789	461.9	.06886	.6545	.02530	39.14	25.06	.00319	1.01143	.7482
	50.	3.5980	486.3	.06848	.6603	.02379	40.40	25.82	.00349	1.01088	.7396
	52.	3.4354	510.8	.06804	.6652	.02247	41.67	26.58	.00380	1.01039	.7324
	56.	3.1544	560.8	.06698	.6730	.02028	44.25	28.08	.00444	1.00954	.7216
	60.	2.9193	612.5	.06566	.6788	.01852	46.93	29.54	.00510	1.00882	.7139
	65.	2.6734	681.0	.06361	.6843	.01674	50.63	31.32	.00598	1.00808	.7053
	70.	2.4678	754.7	.06119	.6883	.01531	54.36	33.05	.00686	1.00746	.7024
	75.	2.2929	834.7	.05850	.6914	.01412	57.99	34.73	.00773	1.00693	.7058
	80.	2.1422	921.2	.05569	.6937	.01311	61.80	36.37	.00860	1.00647	.7109
	90.	1.8949	1113.6	.05018	.6970	.01150	71.59	39.54	.01062	1.00572	.7071
	100.	1.7000	1327.6	.04539	.6991	.01025	81.40	42.58	.01266	1.00513	.7120
	110.	1.5423	1555.5	.04155	.7005	.00926	92.78	44.87	.01504	1.00465	.6966
	120.	1.4118	1787.0	.03871	.7014	.00845	103.35	47.69	.01746	1.00426	.6966
	130.	1.3020	2013.6	.03671	.7021	.00777	113.34	50.43	.02003	1.00393	.6962
	140.	1.2082	2229.6	.03537	.7025	.00720	122.24	53.09	.02270	1.00364	.6968
	160.	1.0564	2615.6	.03417	.7030	.00627	136.73	58.21	.02839	1.00319	.6987
	180.	.9387	2941.5	.03419	.7032	.00556	147.84	63.12	.03464	1.00283	.6989
	200.	.8447	3222.4	.03484	.7032	.00500	156.89	67.85	.04149	1.00255	.6970
	220.	.7680	3477.1	.03574	.7032	.00454	164.84	72.43	.04893	1.00232	.6940
	240.	.7040	3721.1	.03667	.7031	.00416	172.27	76.87	.05689	1.00212	.6909
	260.	.6499	3965.1	.03749	.7030	.00384	179.51	81.19	.06531	1.00196	.6885
	280.	.6036	4213.8	.03816	.7029	.00356	186.75	85.40	.07416	1.00182	.6868
	300.	.5635	4469.2	.03868	.7029	.00333	194.04	89.51	.08341	1.00170	.6856
	350.	.4832	5138.6	.03943	.7026	.00285	212.63	99.43	.10818	1.00146	.6848
	400.	.4229	5838.0	.03972	.7023	.00249	231.50	108.89	.13537	1.00127	.6847
	450.	.3760	6557.2	.03977	.7021	.00222	250.33	117.97	.16488	1.00113	.6850
	500.	.3385	7281.6	.03978	.7020	.00200	268.91	126.72	.19683	1.00102	.6847
	550.	.3078	8013.0	.03974	.7018	.00181	287.16	135.19	.23104	1.00093	.6844
	600.	.2822	8749.7	.03966	.7017	.00166	305.09	143.42	.26744	1.00085	.6841
	700.	.2420	10244.4	.03944	.7015	.00143	340.22	159.24	.34653	1.00073	.6837
	800.	.2118	11778.5	.03908	.7013	.00125	374.90	174.35	.43360	1.00064	.6836
	900.	.1883	13362.8	.03861	.7012	.00111	409.64	188.90	.52835	1.00057	.6836
	1000.	.1695	15004.8	.03804	.7010	.00100	444.73	202.95	.63048	1.00051	.6838
	1200.	.1413	18463.4	.03673	.7009	.00083	511.13	229.87	.84761	1.00043	.6911
	1400.	.1211	22150.6	.03535	.7008	.00071	583.45	255.50	1.09733	1.00036	.6921
	1600.	.1060	26007.2	.03408	.7007	.00062	656.69	280.05	1.37359	1.00032	.6926
	1800.	.0942	30106.1	.03281	.7005	.00056	734.78	303.67	1.68002	1.00028	.6907
	2000.	.0848	34834.1	.03116	.7003	.00050	832.46	326.45	2.03055	1.00026	.6827
	2200.	.0770	40976.4	.02870	.6997	.00045	979.69	344.98	2.45775	1.00023	.6561
	2400.	.0705	49905.0	.02520	.6983	.00042	1228.04	366.56	3.01009	1.00021	.6222
	2600.	.0648	63597.8	.02097	.6953	.00039	1651.33	388.05	3.72721	1.00020	.5787
	2800.	.0597	84473.9	.01668	.6897	.00036	2339.64	409.90	4.61056	1.00018	.5365
	3000.	.0549	114990.9	.01299	.6799	.00034	3384.84	432.70	5.62467	1.00017	.5044

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.75 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.051	.01291	1.2178	.9319	-308.6	-299.0	4.984	4.71	6.38	1284.
15.	.01304	1.1277	.9313	-302.5	-292.7	5.417	4.90	6.86	1257.
16.	.01319	1.0478	.9140	-295.5	-285.6	5.872	5.09	7.31	1226.
17.	.01334	.9810	.8983	-288.1	-278.1	6.330	5.27	7.76	1202.
18.	.01351	.9174	.8835	-280.2	-270.1	6.787	5.44	8.23	1179.
19.	.01370	.8550	.8683	-271.8	-261.6	7.246	5.58	8.73	1156.
20.	.01390	.7907	.8516	-263.0	-252.6	7.707	5.72	9.26	1132.
21.	.01411	.7266	.8329	-253.6	-243.0	8.173	5.83	9.82	1107.
22.	.01436	.6608	.8122	-243.7	-232.9	8.644	5.93	10.45	1079.
23.	.01462	.5926	.7885	-233.1	-222.1	9.125	6.01	11.17	1050.
24.	.01493	.5258	.7609	-221.7	-210.5	9.617	6.08	11.97	1017.
25.	.01527	.4558	.7288	-209.6	-198.1	10.124	6.13	12.93	980.
26.	.01568	.3884	.6909	-196.4	-184.7	10.651	6.18	14.04	939.
27.	.01616	.3173	.6467	-182.0	-169.9	11.207	6.24	15.53	889.
28.	.01676	.2468	.5963	-166.0	-153.4	11.808	6.31	17.64	831.
29.	.01756	.1748	.5369	-147.3	-134.1	12.484	6.40	21.14	760.
* 29.433	.01801	.1445	.5072	-138.0	-124.5	12.814	6.45	23.44	725.
* 29.433	.10318	.0381	.0497	108.0	185.4	23.347	7.36	27.54	378.
30.	.11069	.0463	.0454	117.1	200.1	23.842	7.19	23.52	389.
31.	.12173	.0581	.0402	130.2	221.5	24.546	6.99	19.78	405.
32.	.13146	.0681	.0366	141.6	240.2	25.138	6.86	17.71	419.
33.	.14040	.0771	.0337	152.0	257.2	25.663	6.77	16.37	432.
34.	.14879	.0852	.0315	161.5	273.1	26.137	6.66	15.41	444.
36.	.16448	.1001	.0280	179.2	302.6	26.979	6.53	14.16	466.
38.	.17920	.1136	.0254	195.7	330.1	27.723	6.46	13.38	485.
40.	.19327	.1262	.0233	211.3	356.3	28.395	6.42	12.86	503.
42.	.20686	.1382	.0216	226.4	381.6	29.013	6.39	12.48	519.
44.	.22009	.1497	.0202	241.2	406.2	29.586	6.38	12.19	535.
46.	.23304	.1607	.0190	255.6	430.4	30.123	6.37	11.97	550.
48.	.24576	.1715	.0179	269.8	454.2	30.628	6.37	11.80	563.
50.	.25829	.1819	.0170	283.9	477.6	31.107	6.38	11.67	577.
52.	.27067	.1922	.0161	297.8	500.8	31.563	6.40	11.57	589.
56.	.29503	.2122	.0147	325.6	546.8	32.415	6.46	11.44	613.
60.	.31900	.2315	.0135	353.2	592.5	33.203	6.56	11.40	634.
65.	.34855	.2552	.0123	388.2	649.6	34.116	6.74	11.45	658.
70.	.37775	.2783	.0113	423.8	707.1	34.969	6.98	11.59	680.
75.	.40668	.3010	.0105	460.6	765.6	35.776	7.28	11.82	699.
80.	.43541	.3235	.0098	498.8	825.4	36.548	7.63	12.10	716.
90.	.49241	.3676	.0086	580.6	949.9	38.014	8.43	12.82	748.
100.	.54896	.4112	.0077	670.4	1082.1	39.406	9.29	13.53	777.
110.	.60518	.4543	.0070	768.5	1222.4	40.740	10.12	14.41	804.
120.	.66118	.4970	.0064	874.2	1370.1	42.025	10.84	15.11	832.
130.	.71701	.5395	.0059	986.3	1524.1	43.257	11.42	15.66	860.
140.	.77270	.5817	.0054	1103.2	1682.7	44.432	11.83	16.05	888.
160.	.88380	.6659	.0047	1345.5	2008.3	46.606	12.22	16.42	946.
180.	.99462	.7496	.0042	1590.8	2336.7	48.540	12.19	16.37	1003.
200.	1.10525	.8330	.0038	1832.9	2661.9	50.253	11.95	16.12	1060.
220.	1.21575	.9163	.0034	2069.2	2981.0	51.774	11.64	15.80	1115.
240.	1.32614	.9994	.0031	2299.2	3293.8	53.135	11.33	15.49	1169.
260.	1.43646	1.0824	.0029	2523.5	3600.8	54.364	11.08	15.23	1220.
280.	1.54673	1.1653	.0027	2743.1	3903.2	55.484	10.88	15.02	1269.
300.	1.65687	1.2481	.0025	2959.4	4202.1	56.516	10.72	14.86	1315.
350.	1.93223	1.4549	.0021	3489.8	4939.0	58.787	10.51	14.55	1424.
400.	2.20745	1.6615	.0019	4013.2	5668.8	60.737	10.43	14.56	1523.
450.	2.48260	1.8680	.0017	4533.7	6395.6	62.450	10.41	14.54	1615.
500.	2.75770	2.0745	.0015	5054.2	7122.4	63.981	10.40	14.53	1702.
550.	3.03275	2.2809	.0014	5574.3	7848.8	65.365	10.41	14.54	1785.
600.	3.30779	2.4872	.0013	6095.3	8576.2	66.630	10.43	14.55	1863.
700.	3.85781	2.8998	.0011	7140.4	10033.8	68.878	10.48	14.61	2010.
800.	4.40778	3.3123	.0009	8193.0	11498.8	70.833	10.57	14.70	2146.
900.	4.95773	3.7249	.0008	9256.4	12974.7	72.570	10.70	14.82	2272.
1000.	5.50767	4.1373	.0008	10333.7	14464.4	74.142	10.86	14.98	2389.
1200.	6.60751	4.9623	.0006	12544.0	17499.6	76.895	11.24	15.37	2604.
1400.	7.70733	5.7872	.0005	14836.7	20617.2	79.302	11.68	15.81	2798.
1600.	8.80722	6.6120	.0005	17216.6	23822.0	81.419	12.11	16.24	2977.
1800.	9.90758	7.4369	.0004	19690.3	27121.0	83.324	12.58	16.71	3143.
2000.	11.01001	8.2617	.0004	22282.4	30539.9	85.190	13.23	17.39	3295.
2200.	12.11903	9.0866	.0003	25048.3	34137.6	87.576	14.35	18.59	3430.
2400.	13.24489	9.9114	.0003	28127.0	38060.7	90.328	16.32	20.73	3548.
2600.	14.40696	10.7363	.0003	31748.4	42553.6	93.428	19.62	24.40	3652.
2800.	15.63741	11.5611	.0003	36252.8	47980.8	96.833	24.74	30.20	3754.
3000.	16.98432	12.3860	.0003	42093.6	54831.8	100.494	32.11	38.75	3862.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.75 MPA ISOBAR

	TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
*	14.051	77.4371	645.6	.25554	94.3031	.00988	75.68	259.43	.00055	1.25306	2.1871
	15.	76.6812	637.2	.24782	86.4746	.01077	83.90	229.58	.00057	1.25040	1.8779
	16.	75.8429	635.4	.23674	79.4675	.01150	90.04	204.56	.00058	1.24745	1.6604
	17.	74.9421	635.2	.22741	73.5219	.01222	94.12	184.10	.00058	1.24429	1.5179
	18.	73.9982	632.6	.21963	67.8869	.01301	97.04	167.28	.00057	1.24099	1.4193
	19.	73.0065	627.5	.21297	62.4230	.01391	98.78	153.19	.00056	1.23752	1.3535
	20.	71.9596	618.6	.20706	56.9019	.01497	100.35	141.14	.00054	1.23387	1.3020
	21.	70.8480	607.1	.20169	51.4765	.01618	102.15	130.65	.00053	1.23000	1.2565
	22.	69.6612	592.5	.19669	46.0331	.01764	103.19	121.36	.00051	1.22587	1.2294
	23.	68.3781	574.0	.19189	40.5180	.01946	103.52	112.95	.00049	1.22143	1.2189
	24.	66.9921	553.9	.18691	35.2244	.02160	103.21	105.28	.00046	1.21663	1.2205
	25.	65.4734	529.4	.18150	29.8419	.02442	102.29	98.11	.00044	1.21140	1.2401
	26.	63.7896	503.3	.17518	24.7737	.02789	100.69	91.31	.00040	1.20561	1.2728
	27.	61.8910	471.5	.16753	19.6361	.03294	98.44	84.72	.00037	1.19910	1.3366
	28.	59.6744	435.6	.15846	14.7274	.04049	95.37	78.09	.00033	1.19154	1.4441
	29.	56.9530	392.0	.14735	9.9553	.05393	91.22	71.14	.00027	1.18229	1.6490
*	29.433	55.5286	370.9	.14163	8.0260	.06319	88.93	67.91	.00025	1.17747	1.7896
*	29.433	9.6920	205.6	.06958	.3694	.13443	34.97	18.42	.00047	1.02951	1.4558
	30.	9.0339	217.0	.06983	.4184	.10840	33.34	18.47	.00056	1.02749	1.3032
	31.	8.2152	234.8	.07002	.4773	.08427	32.27	18.70	.00071	1.02497	1.1464
	32.	7.6071	251.0	.07008	.5181	.07057	31.95	19.00	.00085	1.02311	1.0534
	33.	7.1226	266.4	.06999	.5489	.06146	31.94	19.33	.00099	1.02163	.9909
	34.	6.7210	280.5	.07029	.5729	.05494	32.12	19.69	.00112	1.02040	.9448
	36.	6.0798	307.8	.07050	.6086	.04601	32.79	20.45	.00137	1.01844	.8830
	38.	5.5804	334.2	.07046	.6340	.04005	33.70	21.23	.00162	1.01692	.8432
	40.	5.1742	360.0	.07028	.6532	.03572	34.73	22.01	.00188	1.01568	.8150
	42.	4.8342	385.3	.07004	.6681	.03238	35.83	22.80	.00214	1.01464	.7939
	44.	4.5436	410.2	.06976	.6800	.02971	36.98	23.59	.00240	1.01376	.7774
	46.	4.2911	434.9	.06944	.6897	.02752	38.17	24.36	.00268	1.01299	.7640
	48.	4.0690	459.5	.06909	.6977	.02568	39.39	25.14	.00295	1.01231	.7529
	50.	3.8716	484.1	.06869	.7044	.02410	40.63	25.90	.00324	1.01171	.7436
	52.	3.6946	508.8	.06824	.7101	.02273	41.89	26.66	.00353	1.01118	.7360
	56.	3.3895	559.0	.06715	.7191	.02046	44.45	28.14	.00413	1.01025	.7243
	60.	3.1348	611.0	.06581	.7258	.01866	47.12	29.60	.00475	1.00948	.7160
	65.	2.8690	679.6	.06375	.7321	.01684	50.80	31.37	.00557	1.00867	.7069
	70.	2.6473	753.5	.06131	.7367	.01538	54.52	33.10	.00640	1.00800	.7037
	75.	2.4589	833.6	.05861	.7402	.01417	58.12	34.78	.00720	1.00743	.7069
	80.	2.2967	920.2	.05579	.7429	.01315	61.93	36.42	.00802	1.00694	.7118
	90.	2.0308	1112.7	.05027	.7466	.01152	71.71	39.58	.00991	1.00613	.7077
	100.	1.8216	1326.8	.04546	.7490	.01027	81.51	42.61	.01182	1.00550	.7124
	110.	1.6524	1555.0	.04161	.7506	.00927	92.83	44.89	.01403	1.00499	.6970
	120.	1.5124	1786.6	.03876	.7517	.00846	103.40	47.71	.01629	1.00456	.6969
	130.	1.3947	2013.4	.03675	.7524	.00778	113.38	50.44	.01869	1.00421	.6964
	140.	1.2942	2229.5	.03541	.7529	.00720	122.28	53.10	.02119	1.00390	.6971
	160.	1.1315	2615.8	.03420	.7534	.00628	136.76	58.22	.02650	1.00341	.6989
	180.	1.0054	2942.0	.03421	.7537	.00557	147.87	63.13	.03234	1.00303	.6990
	200.	.9048	3223.1	.03486	.7537	.00500	156.91	67.86	.03873	1.00273	.6971
	220.	.8225	3477.9	.03576	.7537	.00454	164.85	72.43	.04568	1.00248	.6940
	240.	.7541	3722.1	.03669	.7536	.00416	172.28	76.87	.05311	1.00227	.6910
	260.	.6962	3966.1	.03751	.7535	.00384	179.53	81.19	.06098	1.00210	.6886
	280.	.6465	4214.9	.03818	.7534	.00356	186.76	85.40	.06924	1.00195	.6868
	300.	.6035	4470.3	.03870	.7533	.00332	194.05	89.52	.07787	1.00182	.6856
	350.	.5175	5139.9	.03944	.7530	.00285	212.64	99.43	.10100	1.00156	.6848
	400.	.4530	5839.3	.03973	.7527	.00249	231.51	108.89	.12637	1.00137	.6847
	450.	.4028	6558.6	.03978	.7525	.00222	250.34	117.97	.15392	1.00121	.6850
	500.	.3626	7283.0	.03979	.7523	.00199	268.92	126.72	.18375	1.00109	.6847
	550.	.3297	8014.5	.03974	.7521	.00181	287.17	135.19	.21568	1.00099	.6844
	600.	.3023	8751.2	.03967	.7519	.00166	305.09	143.42	.24965	1.00091	.6841
	700.	.2592	10245.9	.03944	.7517	.00143	340.22	159.24	.32347	1.00078	.6837
	800.	.2269	11780.0	.03909	.7515	.00125	374.90	174.36	.40475	1.00068	.6836
	900.	.2017	13364.3	.03862	.7513	.00111	409.64	188.90	.49318	1.00061	.6836
	1000.	.1816	15006.4	.03804	.7512	.00100	444.73	202.95	.58851	1.00055	.6838
	1200.	.1513	18465.0	.03673	.7510	.00083	511.13	229.88	.79117	1.00046	.6911
	1400.	.1297	22152.1	.03535	.7509	.00071	583.44	255.50	1.02425	1.00039	.6921
	1600.	.1135	26007.6	.03408	.7508	.00062	656.64	280.05	1.28207	1.00034	.6926
	1800.	.1009	30100.1	.03283	.7506	.00056	734.48	303.67	1.56787	1.00030	.6908
	2000.	.0908	34804.1	.03120	.7504	.00050	831.23	326.45	1.89422	1.00027	.6831
	2200.	.0825	40877.7	.02878	.7498	.00045	975.84	344.98	2.29063	1.00025	.6571
	2400.	.0755	49646.8	.02536	.7483	.00042	1218.15	366.54	2.80154	1.00023	.6239
	2600.	.0694	63023.8	.02118	.7452	.00039	1629.55	388.01	3.46441	1.00021	.5809
	2800.	.0639	83353.0	.01693	.7393	.00036	2297.35	409.81	4.28256	1.00019	.5387
	3000.	.0589	113029.4	.01322	.7293	.00034	3311.10	432.53	5.22482	1.00018	.5062

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.80 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	14.067	.01291	1.2211	.9325	-308.6	-298.3	4.985	4.71	6.38	1286.
	15.	.01303	1.1342	.9319	-302.6	-292.1	5.410	4.90	6.85	1259.
	16.	.01318	1.0530	.9155	-295.6	-285.1	5.865	5.09	7.30	1229.
	17.	.01333	.9860	.8998	-288.2	-277.5	6.322	5.27	7.75	1204.
	18.	.01350	.9223	.8850	-280.3	-269.5	6.779	5.43	8.22	1181.
	19.	.01369	.8601	.8698	-272.0	-261.1	7.237	5.58	8.71	1159.
	20.	.01388	.7958	.8531	-263.2	-252.1	7.697	5.71	9.24	1134.
	21.	.01410	.7318	.8346	-253.9	-242.6	8.161	5.83	9.80	1109.
	22.	.01434	.6662	.8139	-243.9	-232.5	8.631	5.93	10.42	1082.
	23.	.01461	.5980	.7903	-233.4	-221.7	9.111	6.01	11.13	1053.
	24.	.01491	.5315	.7631	-222.1	-210.2	9.601	6.08	11.92	1021.
	25.	.01525	.4638	.7313	-210.0	-197.8	10.105	6.13	12.83	985.
	26.	.01565	.3950	.6939	-197.0	-184.4	10.630	6.18	13.94	944.
	27.	.01612	.3242	.6505	-182.7	-169.8	11.181	6.24	15.39	895.
	28.	.01670	.2545	.6010	-166.9	-153.5	11.775	6.30	17.39	838.
	29.	.01747	.1831	.5432	-148.6	-134.6	12.437	6.39	20.66	769.
*	29.828	.01837	.1248	.4856	-130.4	-115.7	13.080	6.49	25.51	700.
*	29.828	.09519	.0349	.0545	104.8	180.9	23.030	7.46	30.49	378.
	30.	.09783	.0379	.0526	108.2	186.5	23.214	7.38	28.36	382.
	31.	.10956	.0516	.0455	123.5	211.2	24.025	7.12	22.06	400.
	32.	.11945	.0627	.0408	136.1	231.6	24.674	6.95	19.10	415.
	33.	.12833	.0723	.0374	147.2	249.8	25.235	6.84	17.33	428.
	34.	.13656	.0810	.0347	157.3	266.5	25.733	6.71	16.12	441.
	36.	.15178	.0966	.0306	175.7	297.1	26.608	6.56	14.61	464.
	38.	.16594	.1106	.0276	192.6	325.3	27.371	6.48	13.70	484.
	40.	.17939	.1236	.0253	208.6	352.1	28.058	6.43	13.10	502.
	42.	.19234	.1358	.0234	224.0	377.8	28.686	6.40	12.67	518.
	44.	.20491	.1475	.0218	238.9	402.8	29.267	6.39	12.35	534.
	46.	.21720	.1588	.0205	253.5	427.3	29.811	6.38	12.10	549.
	48.	.22925	.1697	.0193	267.9	451.3	30.322	6.38	11.91	563.
	50.	.24110	.1804	.0183	282.1	475.0	30.805	6.39	11.77	576.
	52.	.25280	.1908	.0173	296.1	498.4	31.264	6.41	11.65	589.
	56.	.27580	.2110	.0158	324.0	544.7	32.122	6.47	11.51	613.
	60.	.29840	.2305	.0145	351.9	590.6	32.914	6.57	11.45	634.
	65.	.32623	.2544	.0132	386.9	647.9	33.831	6.75	11.49	658.
	70.	.35372	.2777	.0121	422.7	705.7	34.688	6.98	11.63	680.
	75.	.38093	.3005	.0112	459.6	764.3	35.497	7.28	11.85	699.
	80.	.40794	.3231	.0105	497.9	824.3	36.270	7.63	12.13	717.
	90.	.46149	.3675	.0092	579.8	949.0	37.739	8.43	12.84	748.
	100.	.51461	.4112	.0082	669.7	1081.4	39.133	9.29	13.64	777.
	110.	.56739	.4543	.0074	767.9	1221.8	40.468	10.12	14.43	805.
	120.	.61995	.4972	.0068	873.7	1369.6	41.755	10.84	15.12	832.
	130.	.67234	.5397	.0062	985.8	1523.7	42.987	11.42	15.66	861.
	140.	.72459	.5821	.0058	1102.7	1682.4	44.163	11.83	16.06	889.
	160.	.82881	.6663	.0050	1345.1	2008.1	46.337	12.22	16.42	946.
	180.	.93276	.7501	.0045	1590.4	2336.6	48.272	12.19	16.38	1004.
	200.	1.03651	.8336	.0040	1832.7	2661.9	49.985	11.95	16.12	1060.
	220.	1.14013	.9169	.0037	2069.0	2981.1	51.507	11.64	15.80	1116.
	240.	1.24366	1.0000	.0033	2299.0	3293.9	52.868	11.33	15.49	1169.
	260.	1.34710	1.0831	.0031	2523.3	3601.0	54.097	11.08	15.23	1220.
	280.	1.45049	1.1660	.0029	2743.0	3903.4	55.218	10.88	15.02	1269.
	300.	1.55377	1.2488	.0027	2959.3	4202.3	56.249	10.72	14.86	1316.
	350.	1.81194	1.4557	.0023	3489.7	4939.3	58.520	10.51	14.65	1424.
	400.	2.06998	1.6623	.0020	4013.1	5669.1	60.471	10.43	14.56	1523.
	450.	2.32794	1.8689	.0018	4533.6	6395.9	62.184	10.41	14.54	1616.
	500.	2.58586	2.0753	.0016	5054.1	7122.8	63.714	10.40	14.53	1703.
	550.	2.84373	2.2817	.0015	5574.2	7849.2	65.099	10.41	14.54	1785.
	600.	3.10158	2.4880	.0013	6095.3	8576.6	66.363	10.43	14.55	1864.
	700.	3.61723	2.9007	.0011	7140.4	10034.2	68.612	10.48	14.61	2011.
	800.	4.13284	3.3132	.0010	8193.0	11499.2	70.567	10.57	14.70	2146.
	900.	4.64842	3.7257	.0009	9256.4	12975.1	72.303	10.70	14.82	2272.
	1000.	5.16399	4.1382	.0008	10333.6	14464.8	73.876	10.86	14.98	2390.
	1200.	6.19509	4.9631	.0007	12543.9	17500.0	76.629	11.24	15.37	2605.
	1400.	7.22618	5.7880	.0006	14836.7	20617.6	79.036	11.68	15.81	2799.
	1600.	8.25732	6.6129	.0005	17216.5	23822.4	81.153	12.11	16.24	2977.
	1800.	9.28889	7.4378	.0004	19689.8	27121.0	83.057	12.57	16.70	3144.
	2000.	10.32234	8.2626	.0004	22280.3	30538.2	84.923	13.22	17.38	3296.
	2200.	11.36178	9.0875	.0004	25041.2	34130.6	87.307	14.31	18.54	3431.
	2400.	12.41649	9.9123	.0003	28107.0	38040.2	90.053	16.23	20.63	3549.
	2600.	13.50409	10.7372	.0003	31700.0	42503.3	93.141	19.43	24.19	3654.
	2800.	14.65376	11.5620	.0003	36149.8	47872.8	96.524	24.41	29.82	3756.
	3000.	15.90915	12.3869	.0003	41895.2	54622.5	100.150	31.55	38.10	3863.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.80 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	14.067	77.4651	647.3	.25548	94.5954	.00986	75.88	259.74	.00055	1.25315	2.1840
	15.	76.7248	639.7	.24789	87.0229	.01071	83.96	230.36	.00058	1.25055	1.8798
	16.	75.8894	637.2	.23706	79.9090	.01146	90.11	205.24	.00059	1.24761	1.6627
	17.	74.9923	637.0	.22772	73.9430	.01217	94.21	184.71	.00058	1.24447	1.5196
	18.	74.0521	634.5	.21992	68.2963	.01296	97.15	167.84	.00057	1.24118	1.4204
	19.	73.0644	629.5	.21325	62.8392	.01384	98.91	153.70	.00056	1.23772	1.3540
	20.	72.0222	620.7	.20734	57.3120	.01489	100.49	141.61	.00054	1.23409	1.3021
	21.	70.9163	609.5	.20196	51.8962	.01608	102.31	131.10	.00053	1.23024	1.2559
	22.	69.7362	595.0	.19695	46.4549	.01752	103.37	121.79	.00051	1.22613	1.2282
	23.	68.4619	576.7	.19215	40.9370	.01931	103.72	113.38	.00049	1.22172	1.2171
	24.	67.0865	556.9	.18721	35.6589	.02140	103.44	105.70	.00047	1.21696	1.2177
	25.	65.5816	533.8	.18185	30.4152	.02404	102.55	98.55	.00044	1.21177	1.2333
	26.	63.9171	507.2	.17564	25.2504	.02748	101.00	91.76	.00041	1.20605	1.2664
	27.	62.0450	475.9	.16816	20.1166	.03234	98.80	85.20	.00037	1.19963	1.3271
	28.	59.8722	440.8	.15929	15.2350	.03945	95.82	78.64	.00033	1.19221	1.4271
	29.	57.2336	398.5	.14856	10.4781	.05184	91.83	71.81	.00028	1.18324	1.6155
*	29.828	54.4335	356.9	.13744	6.7925	.07148	87.32	65.59	.00023	1.17378	1.9164
*	29.828	10.5055	205.0	.06963	.3666	.14877	36.90	18.93	.00041	1.03202	1.5642
	30.	10.2218	208.9	.06974	.3877	.13577	36.00	18.91	.00045	1.03114	1.4895
	31.	9.1271	228.2	.07006	.4710	.09664	33.73	19.00	.00060	1.02777	1.2426
	32.	8.3720	245.4	.07018	.5246	.07784	32.98	19.24	.00074	1.02545	1.1146
	33.	7.7923	261.3	.07011	.5634	.06630	32.75	19.54	.00087	1.02368	1.0339
	34.	7.3227	275.8	.07049	.5930	.05844	32.79	19.88	.00100	1.02224	.9770
	36.	6.5883	303.6	.07078	.6361	.04810	33.30	20.60	.00125	1.01999	.9034
	38.	6.0264	330.5	.07074	.6664	.04146	34.12	21.36	.00149	1.01828	.8575
	40.	5.5746	356.6	.07056	.6889	.03672	35.10	22.13	.00173	1.01690	.8258
	42.	5.1992	382.2	.07031	.7062	.03314	36.16	22.91	.00198	1.01575	.8024
	44.	4.8801	407.5	.07001	.7200	.03030	37.28	23.68	.00223	1.01478	.7843
	46.	4.6041	432.4	.06968	.7312	.02799	38.45	24.45	.00248	1.01394	.7697
	48.	4.3621	457.2	.06931	.7405	.02605	39.65	25.22	.00275	1.01320	.7577
	50.	4.1476	482.0	.06890	.7482	.02441	40.88	25.98	.00302	1.01255	.7478
	52.	3.9557	506.8	.06843	.7547	.02299	42.12	26.73	.00329	1.01197	.7395
	56.	3.6258	557.3	.06732	.7649	.02065	44.66	28.21	.00385	1.01097	.7270
	60.	3.3512	609.4	.06597	.7726	.01880	47.31	29.66	.00444	1.01013	.7182
	65.	3.0653	678.3	.06389	.7797	.01694	50.98	31.43	.00521	1.00927	.7086
	70.	2.8271	752.3	.06144	.7850	.01546	54.67	33.15	.00599	1.00854	.7050
	75.	2.6251	832.5	.05873	.7889	.01423	58.26	34.82	.00674	1.00793	.7080
	80.	2.4513	919.2	.05589	.7920	.01320	62.06	36.46	.00751	1.00741	.7127
	90.	2.1669	1111.9	.05035	.7962	.01155	71.83	39.62	.00929	1.00654	.7083
	100.	1.9432	1326.1	.04553	.7990	.01029	81.63	42.65	.01109	1.00587	.7128
	110.	1.7625	1554.4	.04166	.8007	.00928	92.89	44.90	.01315	1.00532	.6974
	120.	1.6130	1786.2	.03880	.8019	.00846	103.45	47.72	.01527	1.00487	.6973
	130.	1.4873	2013.1	.03679	.8027	.00778	113.42	50.45	.01753	1.00449	.6967
	140.	1.3801	2229.4	.03544	.8033	.00720	122.32	53.11	.01987	1.00416	.6973
	160.	1.2065	2616.0	.03423	.8039	.00628	136.79	58.23	.02485	1.00364	.6991
	180.	1.0721	2942.4	.03424	.8042	.00557	147.89	63.14	.03032	1.00323	.6992
	200.	.9648	3223.7	.03488	.8042	.00500	156.93	67.86	.03632	1.00291	.6972
	220.	.8771	3478.7	.03578	.8042	.00454	164.87	72.44	.04283	1.00265	.6941
	240.	.8041	3723.0	.03671	.8041	.00416	172.30	76.87	.04981	1.00242	.6910
	260.	.7423	3967.1	.03752	.8040	.00384	179.54	81.19	.05718	1.00224	.6886
	280.	.6894	4215.9	.03819	.8039	.00356	186.77	85.40	.06493	1.00208	.6869
	300.	.6436	4471.5	.03871	.8037	.00332	194.07	89.52	.07303	1.00194	.6857
	350.	.5519	5141.1	.03945	.8034	.00285	212.65	99.43	.09471	1.00166	.6848
	400.	.4831	5840.6	.03974	.8031	.00249	231.52	108.89	.11850	1.00146	.6848
	450.	.4296	6559.9	.03979	.8028	.00222	250.35	117.97	.14433	1.00129	.6850
	500.	.3867	7284.5	.03980	.8026	.00199	268.93	126.72	.17230	1.00117	.6847
	550.	.3517	8015.9	.03975	.8024	.00181	287.17	135.20	.20223	1.00106	.6844
	600.	.3224	8752.6	.03968	.8022	.00166	305.10	143.42	.23409	1.00097	.6841
	700.	.2765	10247.4	.03945	.8019	.00143	340.23	159.24	.30330	1.00083	.6837
	800.	.2420	11781.5	.03910	.8017	.00125	374.91	174.36	.37950	1.00073	.6836
	900.	.2151	13365.9	.03862	.8015	.00111	409.64	188.90	.45241	1.00065	.6836
	1000.	.1936	15008.0	.03805	.8014	.00100	444.73	202.96	.55179	1.00058	.6838
	1200.	.1614	18466.6	.03674	.8011	.00083	511.13	229.88	.74179	1.00049	.6911
	1400.	.1384	22153.7	.03535	.8010	.00071	583.44	255.50	.96030	1.00042	.6921
	1600.	.1211	26008.2	.03409	.8009	.00062	656.59	280.05	1.20199	1.00036	.6926
	1800.	.1077	30094.9	.03284	.8007	.00056	734.20	303.67	1.46976	1.00032	.6909
	2000.	.0969	34777.1	.03123	.8005	.00050	830.12	326.45	1.77502	1.00029	.6834
	2200.	.0880	40788.6	.02886	.7998	.00045	972.36	344.98	2.14468	1.00027	.6579
	2400.	.0805	49413.3	.02550	.7983	.00042	1209.20	366.53	2.61970	1.00024	.6254
	2600.	.0741	62504.4	.02138	.7951	.00039	1609.83	387.98	3.23552	1.00022	.5829
	2800.	.0682	82338.1	.01716	.7890	.00036	2259.05	409.74	3.99694	1.00021	.5408
	3000.	.0629	111251.3	.01345	.7786	.00034	3244.24	432.37	4.87643	1.00019	.5078

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.85 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	14.084	.01290	1.2245	.9330	-308.6	-297.6	4.986	4.71	6.38	1287.
	15.	.01303	1.1407	.9325	-302.6	-291.6	5.403	4.90	6.84	1262.
	16.	.01317	1.0581	.9170	-295.7	-284.5	5.857	5.09	7.29	1232.
	17.	.01333	.9909	.9012	-288.3	-277.0	6.314	5.27	7.74	1207.
	18.	.01349	.9271	.8864	-280.5	-269.0	6.770	5.43	8.21	1184.
	19.	.01368	.8650	.8713	-272.2	-260.6	7.227	5.58	8.70	1161.
	20.	.01387	.8007	.8547	-263.4	-251.6	7.687	5.71	9.22	1137.
	21.	.01409	.7370	.8362	-254.1	-242.1	8.150	5.82	9.78	1112.
	22.	.01432	.6714	.8156	-244.2	-232.0	8.619	5.92	10.40	1085.
	23.	.01459	.6054	.7923	-233.7	-221.3	9.096	6.01	11.08	1057.
	24.	.01489	.5372	.7651	-222.5	-209.8	9.585	6.07	11.87	1025.
	25.	.01522	.4700	.7337	-210.4	-197.5	10.087	6.13	12.77	989.
	26.	.01561	.4016	.6969	-197.5	-184.2	10.608	6.18	13.85	949.
	27.	.01608	.3310	.6542	-183.4	-169.7	11.156	6.23	15.26	900.
	28.	.01665	.2619	.6055	-167.7	-153.6	11.743	6.30	17.16	845.
	29.	.01739	.1929	.5494	-149.8	-135.1	12.392	6.38	20.10	780.
	30.	.01846	.1208	.4807	-128.0	-112.3	13.162	6.50	26.06	696.
*	30.205	.01876	.1058	.4640	-122.7	-106.8	13.346	6.54	28.17	675.
*	30.205	.08797	.0316	.0598	101.2	176.0	22.712	7.56	34.05	377.
	31.	.09834	.0445	.0518	115.9	199.5	23.481	7.27	25.33	394.
	32.	.10859	.0569	.0456	130.0	222.3	24.206	7.05	20.87	410.
	33.	.11753	.0674	.0413	142.1	242.0	24.811	6.92	18.47	424.
	34.	.12567	.0766	.0381	152.8	259.6	25.338	6.77	16.93	438.
	36.	.14053	.0930	.0333	172.0	291.5	26.248	6.59	15.10	461.
	38.	.15420	.1075	.0299	189.4	320.5	27.034	6.50	14.04	482.
	40.	.16712	.1209	.0273	205.8	347.9	27.735	6.45	13.35	500.
	42.	.17952	.1335	.0252	221.5	374.1	28.374	6.41	12.87	517.
	44.	.19152	.1454	.0235	236.6	399.4	28.964	6.40	12.51	533.
	46.	.20322	.1569	.0220	251.4	424.1	29.514	6.39	12.24	548.
	48.	.21468	.1680	.0207	265.9	448.4	30.030	6.39	12.03	562.
	50.	.22594	.1788	.0196	280.2	472.3	30.518	6.40	11.87	576.
	52.	.23704	.1894	.0186	294.4	495.9	30.981	6.42	11.74	589.
	56.	.25884	.2098	.0169	322.5	542.5	31.845	6.48	11.58	612.
	60.	.28023	.2296	.0155	350.5	588.7	32.641	6.57	11.51	634.
	65.	.30655	.2536	.0141	385.7	646.3	33.563	6.75	11.54	658.
	70.	.33251	.2770	.0129	421.6	704.2	34.422	6.99	11.67	680.
	75.	.35821	.3000	.0120	458.6	763.1	35.234	7.28	11.88	699.
	80.	.38370	.3227	.0111	497.0	823.1	36.009	7.63	12.16	717.
	90.	.43422	.3673	.0098	579.0	948.1	37.480	8.43	12.86	748.
	100.	.48430	.4111	.0087	669.0	1080.7	38.876	9.29	13.66	777.
	110.	.53405	.4544	.0079	767.3	1221.2	40.213	10.12	14.44	805.
	120.	.58357	.4973	.0072	873.1	1369.2	41.500	10.84	15.13	833.
	130.	.63293	.5400	.0066	985.3	1523.3	42.733	11.42	15.67	861.
	140.	.68215	.5824	.0062	1102.3	1682.1	43.910	11.83	16.07	889.
	160.	.78030	.6667	.0054	1344.7	2007.9	46.085	12.22	16.43	947.
	180.	.87817	.7506	.0048	1590.1	2336.6	48.021	12.20	16.38	1004.
	200.	.97586	.8342	.0043	1832.4	2661.8	49.733	11.95	16.13	1061.
	220.	1.07342	.9175	.0039	2068.7	2981.1	51.256	11.64	15.80	1116.
	240.	1.17087	1.0007	.0036	2298.7	3294.0	52.617	11.33	15.49	1169.
	260.	1.26825	1.0837	.0033	2523.1	3601.1	53.846	11.08	15.23	1221.
	280.	1.36558	1.1667	.0030	2742.8	3903.5	54.967	10.88	15.02	1269.
	300.	1.46279	1.2496	.0028	2959.1	4202.5	55.999	10.72	14.87	1316.
	350.	1.70580	1.4565	.0024	3489.6	4939.5	58.270	10.51	14.65	1425.
	400.	1.94868	1.6631	.0021	4013.0	5669.4	60.221	10.43	14.56	1524.
	450.	2.19148	1.8697	.0019	4533.5	6396.3	61.934	10.41	14.54	1616.
	500.	2.43423	2.0761	.0017	5054.0	7123.1	63.464	10.40	14.53	1703.
	550.	2.67694	2.2825	.0015	5574.2	7849.6	64.849	10.41	14.54	1785.
	600.	2.91963	2.4889	.0014	6095.2	8576.9	66.113	10.43	14.55	1864.
	700.	3.40496	2.9015	.0012	7140.3	10034.6	68.362	10.48	14.61	2011.
	800.	3.89024	3.3141	.0011	8192.9	11499.7	70.317	10.57	14.70	2146.
	900.	4.37550	3.7266	.0009	9256.4	12975.5	72.053	10.70	14.82	2272.
	1000.	4.86074	4.1391	.0009	10333.6	14465.2	73.625	10.86	14.98	2390.
	1200.	5.83119	4.9640	.0007	12543.9	17500.4	76.379	11.24	15.37	2605.
	1400.	6.80163	5.7889	.0006	14836.7	20618.1	78.786	11.68	15.81	2799.
	1600.	7.77212	6.6138	.0005	17216.5	23822.8	80.903	12.11	16.24	2978.
	1800.	8.74299	7.4387	.0005	19689.4	27121.0	82.807	12.57	16.70	3144.
	2000.	9.71559	8.2635	.0004	22278.4	30536.7	84.672	13.21	17.37	3296.
	2200.	10.69365	9.0884	.0004	25034.7	34124.3	87.053	14.28	18.51	3432.
	2400.	11.68566	9.9132	.0004	28088.7	38021.5	89.794	16.15	20.54	3551.
	2600.	12.70769	10.7381	.0003	31655.9	42457.5	92.871	19.27	24.00	3656.
	2800.	13.78641	11.5629	.0003	36056.0	47774.4	96.235	24.10	29.47	3758.
	3000.	14.96167	12.3877	.0003	41714.6	54432.0	99.830	31.04	37.52	3865.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.85 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.084	77.4930	649.0	.25541	94.8874	.00983	76.09	260.05	.00055	1.25325	2.1811
15.	76.7682	642.2	.24796	87.5695	.01065	84.01	231.15	.00058	1.25070	1.8817
16.	75.9357	639.0	.23736	80.3490	.01141	90.19	205.92	.00059	1.24778	1.6651
17.	75.0421	638.8	.22801	74.3625	.01212	94.30	185.33	.00058	1.24464	1.5213
18.	74.1057	636.3	.22021	68.7039	.01290	97.26	168.40	.00058	1.24136	1.4215
19.	73.1220	631.5	.21352	63.2535	.01377	99.03	154.21	.00056	1.23792	1.3546
20.	72.0844	622.8	.20761	57.7204	.01481	100.63	142.09	.00054	1.23430	1.3022
21.	70.9840	611.8	.20223	52.3136	.01598	102.47	131.55	.00053	1.23047	1.2554
22.	69.8106	597.5	.19721	46.8740	.01740	103.54	122.23	.00051	1.22639	1.2271
23.	68.5490	580.4	.19243	41.4965	.01909	103.93	113.83	.00049	1.22202	1.2136
24.	67.1799	559.9	.18750	36.0897	.02120	103.67	106.13	.00047	1.21728	1.2151
25.	65.6885	537.2	.18218	30.8743	.02376	102.81	98.98	.00044	1.21214	1.2290
26.	64.0425	511.0	.17608	25.7209	.02709	101.30	92.21	.00041	1.20648	1.2603
27.	62.1959	480.2	.16877	20.5895	.03178	99.16	85.68	.00038	1.20015	1.3183
28.	60.0641	445.9	.16008	15.7307	.03849	96.26	79.17	.00034	1.19287	1.4116
29.	57.5085	405.8	.14974	11.0928	.04952	92.43	72.48	.00029	1.18418	1.5761
30.	54.1644	354.7	.13655	6.5442	.07346	87.05	65.05	.00022	1.17287	1.9475
* 30.205	53.3063	342.3	.13319	5.6395	.08228	85.80	63.34	.00021	1.16998	2.0794
* 30.205	11.3673	204.3	.06965	.3589	.16666	39.20	19.47	.00036	1.03467	1.6914
31.	10.1684	221.3	.07004	.4523	.11445	35.70	19.39	.00050	1.03098	1.3755
32.	9.2087	239.6	.07025	.5239	.08710	34.22	19.53	.00064	1.02802	1.1909
33.	8.5084	256.2	.07020	.5731	.07209	33.67	19.78	.00077	1.02587	1.0847
34.	7.9573	271.1	.07067	.6096	.06245	33.53	20.08	.00090	1.02418	1.0138
36.	7.1160	299.5	.07105	.6615	.05040	33.85	20.76	.00113	1.02161	.9258
38.	6.4850	326.8	.07104	.6972	.04296	34.57	21.49	.00137	1.01968	.8729
40.	5.9836	353.3	.07086	.7234	.03778	35.48	22.25	.00160	1.01815	.8371
42.	5.5705	379.3	.07059	.7435	.03392	36.50	23.01	.00183	1.01689	.8112
44.	5.2214	404.7	.07027	.7594	.03091	37.59	23.78	.00207	1.01582	.7914
46.	4.9208	429.9	.06992	.7722	.02847	38.73	24.54	.00232	1.01491	.7755
48.	4.6582	454.9	.06954	.7827	.02644	39.91	25.30	.00256	1.01411	.7626
50.	4.4260	479.9	.06911	.7915	.02473	41.12	26.06	.00282	1.01340	.7520
52.	4.2188	504.9	.06863	.7989	.02325	42.35	26.81	.00308	1.01277	.7432
56.	3.8635	555.6	.06750	.8105	.02084	44.87	28.28	.00361	1.01169	.7298
60.	3.5685	607.9	.06613	.8192	.01894	47.50	29.72	.00416	1.01079	.7204
65.	3.2622	676.9	.06404	.8272	.01704	51.15	31.48	.00489	1.00986	.7102
70.	3.0074	751.1	.06157	.8332	.01553	54.83	33.20	.00563	1.00909	.7063
75.	2.7917	831.4	.05884	.8376	.01429	58.40	34.87	.00634	1.00844	.7092
80.	2.6062	918.2	.05599	.8411	.01324	62.19	36.51	.00707	1.00787	.7136
90.	2.3030	1111.0	.05043	.8458	.01158	71.95	39.66	.00875	1.00696	.7089
100.	2.0648	1325.4	.04559	.8489	.01030	81.74	42.69	.01043	1.00624	.7132
110.	1.8725	1553.9	.04171	.8509	.00929	92.95	44.92	.01238	1.00565	.6978
120.	1.7136	1785.8	.03884	.8522	.00847	103.50	47.73	.01437	1.00517	.6976
130.	1.5800	2012.9	.03682	.8531	.00779	113.47	50.46	.01650	1.00477	.6970
140.	1.4660	2229.4	.03547	.8537	.00721	122.36	53.11	.01870	1.00442	.6975
160.	1.2816	2616.3	.03425	.8544	.00628	136.82	58.24	.02340	1.00387	.6992
180.	1.1387	2942.9	.03426	.8547	.00557	147.92	63.14	.02855	1.00344	.6993
200.	1.0247	3224.4	.03490	.8548	.00500	156.96	67.87	.03419	1.00309	.6973
220.	.9316	3479.5	.03580	.8547	.00454	164.89	72.44	.04032	1.00281	.6942
240.	.8541	3723.9	.03672	.8546	.00416	172.31	76.88	.04689	1.00258	.6911
260.	.7885	3968.2	.03754	.8545	.00384	179.56	81.20	.05383	1.00238	.6887
280.	.7323	4217.0	.03821	.8544	.00356	186.78	85.41	.06112	1.00221	.6869
300.	.6836	4472.6	.03873	.8542	.00332	194.08	89.52	.06875	1.00206	.6857
350.	.5862	5142.4	.03947	.8538	.00285	212.66	99.43	.08916	1.00177	.6849
400.	.5132	5841.9	.03975	.8535	.00249	231.53	108.89	.11156	1.00155	.6848
450.	.4563	6561.3	.03980	.8532	.00222	250.36	117.97	.13587	1.00138	.6850
500.	.4108	7285.9	.03981	.8529	.00199	268.93	126.73	.16219	1.00124	.6847
550.	.3736	8017.3	.03976	.8527	.00181	287.18	135.20	.19037	1.00113	.6844
600.	.3425	8754.1	.03969	.8525	.00166	305.10	143.42	.22036	1.00103	.6841
700.	.2937	10248.9	.03946	.8521	.00143	340.23	159.24	.28550	1.00089	.6837
800.	.2571	11783.0	.03910	.8519	.00125	374.91	174.36	.35723	1.00077	.6836
900.	.2285	13367.4	.03863	.8517	.00111	409.65	188.90	.43526	1.00069	.6836
1000.	.2057	15009.5	.03805	.8515	.00100	444.74	202.96	.51939	1.00062	.6838
1200.	.1715	18468.2	.03674	.8513	.00083	511.13	229.88	.69821	1.00052	.6911
1400.	.1470	22155.3	.03536	.8511	.00071	583.44	255.50	.90388	1.00044	.6921
1600.	.1287	26008.8	.03409	.8510	.00062	656.55	280.05	1.13133	1.00039	.6926
1800.	.1144	30090.3	.03285	.8508	.00056	733.95	303.67	1.38321	1.00034	.6910
2000.	.1029	34752.7	.03126	.8505	.00050	829.10	326.45	1.66992	1.00031	.6837
2200.	.0935	40707.7	.02893	.8499	.00045	969.19	344.97	2.01614	1.00028	.6587
2400.	.0856	49200.8	.02563	.8483	.00042	1201.05	366.52	2.45978	1.00026	.6268
2600.	.0787	62031.5	.02156	.8450	.00039	1591.88	387.95	3.03444	1.00024	.5849
2800.	.0725	81413.4	.01737	.8387	.00036	2224.15	409.67	3.74606	1.00022	.5428
3000.	.0668	109629.5	.01366	.8280	.00034	3183.25	432.23	4.57024	1.00020	.5094

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.90 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.100	.01290	1.2278	.9336	-308.6	-297.0	4.987	4.72	6.38	1289.
15.	.01302	1.1472	.9331	-302.7	-291.0	5.396	4.90	6.83	1265.
16.	.01316	1.0633	.9185	-295.8	-284.0	5.850	5.09	7.28	1234.
17.	.01332	.9959	.9027	-288.5	-276.5	6.306	5.27	7.73	1209.
18.	.01348	.9319	.8879	-280.6	-268.5	6.761	5.43	8.20	1186.
19.	.01367	.8700	.8728	-272.4	-260.1	7.218	5.58	8.68	1164.
20.	.01386	.8057	.8562	-263.6	-251.1	7.677	5.71	9.20	1140.
21.	.01407	.7421	.8377	-254.3	-241.6	8.139	5.82	9.76	1115.
22.	.01431	.6767	.8172	-244.5	-231.6	8.607	5.92	10.37	1088.
23.	.01457	.6109	.7941	-234.0	-220.9	9.082	6.00	11.04	1060.
24.	.01486	.5428	.7672	-222.8	-209.4	9.569	6.07	11.82	1028.
25.	.01520	.4762	.7360	-210.9	-197.2	10.069	6.13	12.70	993.
26.	.01558	.4081	.6998	-198.0	-184.0	10.588	6.18	13.76	953.
27.	.01604	.3377	.6579	-184.0	-169.6	11.131	6.23	15.13	906.
28.	.01660	.2691	.6099	-168.5	-153.6	11.711	6.29	16.96	851.
29.	.01731	.2011	.5551	-151.0	-135.4	12.350	6.37	19.69	788.
30.	.01833	.1312	.4891	-129.9	-113.4	13.096	6.48	24.86	709.
* 30.567	.01918	.0889	.4424	-114.9	-97.7	13.615	6.59	31.34	650.
* 30.567	.08139	.0281	.0656	97.2	170.5	22.391	7.67	38.60	376.
31.	.08768	.0365	.0595	106.9	185.8	22.890	7.46	30.50	387.
32.	.09864	.0507	.0511	123.3	212.1	23.726	7.18	23.21	405.
33.	.10775	.0622	.0457	136.6	233.6	24.386	7.01	19.86	420.
34.	.11588	.0721	.0418	148.1	252.4	24.948	6.83	17.97	434.
36.	.13047	.0893	.0362	168.2	285.6	25.899	6.63	15.64	459.
38.	.14374	.1044	.0324	186.2	315.6	26.708	6.52	14.40	480.
40.	.15620	.1182	.0294	203.0	343.6	27.426	6.46	13.62	499.
42.	.16811	.1311	.0271	218.9	370.2	28.076	6.43	13.07	516.
44.	.17961	.1433	.0252	234.3	395.9	28.675	6.41	12.68	533.
46.	.19079	.1550	.0235	249.3	421.0	29.232	6.40	12.38	548.
48.	.20173	.1663	.0221	264.0	445.5	29.753	6.40	12.15	562.
50.	.21246	.1773	.0209	278.4	469.6	30.245	6.41	11.97	576.
52.	.22303	.1880	.0198	292.7	493.4	30.712	6.42	11.83	588.
56.	.24376	.2086	.0180	321.0	540.4	31.582	6.48	11.65	612.
60.	.26408	.2286	.0165	349.1	586.8	32.382	6.58	11.57	634.
65.	.28905	.2528	.0150	384.5	644.6	33.308	6.75	11.58	658.
70.	.31367	.2764	.0138	420.5	702.8	34.171	6.99	11.70	680.
75.	.33802	.2996	.0127	457.6	761.8	34.985	7.29	11.91	700.
80.	.36216	.3224	.0118	496.0	822.0	35.762	7.63	12.18	717.
90.	.40998	.3671	.0104	578.2	947.2	37.235	8.43	12.88	749.
100.	.45736	.4111	.0093	668.3	1079.9	38.633	9.29	13.57	778.
110.	.50441	.4545	.0084	766.7	1220.6	39.972	10.12	14.45	805.
120.	.55124	.4975	.0077	872.6	1368.7	41.260	10.85	15.14	833.
130.	.59789	.5402	.0070	984.8	1522.9	42.494	11.42	15.58	861.
140.	.64442	.5827	.0065	1101.8	1681.8	43.671	11.83	16.07	890.
160.	.73717	.6671	.0057	1344.3	2007.8	45.847	12.22	16.43	947.
180.	.82966	.7511	.0050	1589.8	2336.5	47.783	12.20	16.39	1005.
200.	.92195	.8347	.0045	1832.1	2661.8	49.496	11.95	16.13	1061.
220.	1.01411	.9181	.0041	2068.5	2981.2	51.019	11.64	15.80	1117.
240.	1.10618	1.0013	.0038	2298.5	3294.1	52.380	11.34	15.49	1170.
260.	1.19817	1.0844	.0035	2522.9	3601.2	53.610	11.08	15.23	1221.
280.	1.29010	1.1674	.0032	2742.6	3903.7	54.731	10.88	15.02	1270.
300.	1.38193	1.2503	.0030	2958.9	4202.7	55.762	10.72	14.87	1316.
350.	1.61146	1.4572	.0026	3489.5	4939.8	58.034	10.51	14.65	1425.
400.	1.84086	1.6639	.0023	4012.9	5669.7	59.985	10.43	14.56	1524.
450.	2.07019	1.8705	.0020	4533.4	6396.6	61.698	10.41	14.54	1616.
500.	2.29945	2.0770	.0018	5054.0	7123.5	63.228	10.40	14.53	1703.
550.	2.52869	2.2834	.0016	5574.1	7849.9	64.613	10.41	14.54	1786.
600.	2.75790	2.4897	.0015	6095.2	8577.3	65.878	10.43	14.55	1864.
700.	3.21627	2.9024	.0013	7140.3	10035.0	68.126	10.48	14.61	2011.
800.	3.67460	3.3149	.0011	8192.9	11500.1	70.081	10.57	14.70	2147.
900.	4.13290	3.7275	.0010	9256.3	12975.9	71.818	10.70	14.82	2273.
1000.	4.59118	4.1400	.0009	10333.6	14465.7	73.390	10.86	14.98	2390.
1200.	5.50773	4.9649	.0008	12543.9	17500.9	76.143	11.24	15.37	2605.
1400.	6.42425	5.7898	.0006	14836.7	20618.5	78.550	11.68	15.81	2799.
1600.	7.34082	6.6147	.0006	17216.4	23823.1	80.667	12.11	16.24	2978.
1800.	8.25775	7.4396	.0005	19689.0	27121.0	82.571	12.57	16.70	3144.
2000.	9.17625	8.2644	.0005	22276.7	30535.4	84.435	13.20	17.35	3296.
2200.	10.09978	9.0893	.0004	25028.8	34118.6	86.815	14.25	18.47	3433.
2400.	11.03610	9.9141	.0004	28071.9	38004.4	89.550	16.07	20.46	3552.
2600.	11.99998	10.7390	.0003	31615.6	42415.6	92.618	19.11	23.83	3658.
2800.	13.01590	11.5638	.0003	35970.1	47684.4	95.964	23.82	29.15	3760.
3000.	14.12044	12.3886	.0003	41549.2	54257.6	99.529	30.58	36.98	3867.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.90 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DV)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.100	77.5208	650.6	.25535	95.1791	.00981	76.29	260.36	.00056	1.25335	2.1781
15.	76.8115	644.7	.24804	88.1146	.01059	84.07	231.93	.00058	1.25085	1.8836
16.	75.9818	640.8	.23767	80.7877	.01137	90.26	206.61	.00059	1.24794	1.6675
17.	75.0917	640.5	.22831	74.7803	.01207	94.39	185.94	.00059	1.24482	1.5231
18.	74.1591	638.2	.22049	69.1097	.01285	97.36	168.95	.00058	1.24155	1.4227
19.	73.1793	633.5	.21380	63.6661	.01371	99.15	154.72	.00056	1.23812	1.3551
20.	72.1462	624.9	.20788	58.1271	.01473	100.77	142.56	.00055	1.23452	1.3023
21.	71.0514	614.1	.20249	52.7287	.01589	102.62	132.00	.00053	1.23071	1.2550
22.	69.8844	599.9	.19747	47.2907	.01728	103.72	122.66	.00052	1.22665	1.2260
23.	68.6311	583.2	.19269	41.9288	.01894	104.13	114.25	.00049	1.22230	1.2118
24.	67.2723	562.8	.18778	36.5169	.02101	103.90	106.55	.00047	1.21760	1.2125
25.	65.7941	540.6	.18251	31.3291	.02349	103.07	99.40	.00044	1.21250	1.2249
26.	64.1659	514.8	.17651	26.1854	.02673	101.60	92.65	.00041	1.20690	1.2546
27.	62.3439	484.3	.16936	21.0554	.03124	99.51	86.15	.00038	1.20065	1.3101
28.	60.2507	450.8	.16085	16.2152	.03761	96.69	79.70	.00034	1.19350	1.3975
29.	57.7616	412.0	.15082	11.6174	.04778	92.98	73.10	.00029	1.18504	1.5477
30.	54.5650	363.7	.13827	7.1562	.06834	87.88	65.89	.00023	1.17422	1.8639
* 30.567	52.1365	328.3	.12885	4.6342	.09546	85.67	61.14	.00019	1.16605	2.2367
* 30.567	12.2868	203.6	.06962	.3458	.18963	41.99	20.06	.00032	1.03752	1.8447
31.	11.4051	213.9	.06992	.4158	.14310	38.62	19.89	.00040	1.03479	1.5758
32.	10.1382	233.6	.07027	.5144	.09938	35.76	19.87	.00055	1.03088	1.2896
33.	9.2804	251.0	.07027	.5773	.07913	34.73	20.04	.00068	1.02824	1.1459
34.	8.6298	266.3	.07085	.6224	.06711	34.35	20.30	.00080	1.02625	1.0563
36.	7.6647	295.4	.07132	.6846	.05293	34.44	20.93	.00103	1.02329	.9505
38.	6.9569	323.2	.07134	.7264	.04457	35.04	21.64	.00126	1.02112	.8894
40.	6.4019	350.1	.07115	.7568	.03890	35.88	22.37	.00148	1.01942	.8491
42.	5.9485	376.3	.07087	.7799	.03474	36.85	23.12	.00171	1.01804	.8204
44.	5.5677	402.0	.07054	.7980	.03153	37.91	23.88	.00193	1.01688	.7987
46.	5.2414	427.5	.07017	.8126	.02896	39.02	24.64	.00217	1.01588	.7815
48.	4.9572	452.7	.06977	.8245	.02684	40.18	25.39	.00240	1.01502	.7677
50.	4.7068	477.8	.06932	.8344	.02505	41.37	26.14	.00264	1.01425	.7563
52.	4.4838	503.0	.06883	.8428	.02352	42.59	26.88	.00289	1.01358	.7469
56.	4.1025	554.0	.06768	.8559	.02103	45.08	28.35	.00340	1.01242	.7326
60.	3.7868	606.5	.06629	.8656	.01908	47.69	29.79	.00392	1.01146	.7226
65.	3.4596	675.6	.06418	.8746	.01714	51.32	31.54	.00461	1.01046	.7119
70.	3.1881	750.0	.06169	.8813	.01560	55.00	33.25	.00531	1.00964	.7076
75.	2.9584	830.3	.05895	.8863	.01434	58.54	34.92	.00598	1.00894	.7103
80.	2.7612	917.2	.05609	.8901	.01328	62.32	36.55	.00667	1.00834	.7145
90.	2.4391	1110.2	.05051	.8954	.01160	72.08	39.70	.00826	1.00737	.7095
100.	2.1865	1324.7	.04566	.8988	.01032	81.85	42.72	.00986	1.00660	.7136
110.	1.9825	1553.4	.04176	.9010	.00930	93.01	44.93	.01169	1.00599	.6982
120.	1.8141	1785.5	.03889	.9025	.00848	103.55	47.74	.01358	1.00548	.6979
130.	1.6725	2012.7	.03686	.9035	.00779	113.51	50.47	.01558	1.00505	.6972
140.	1.5518	2229.3	.03551	.9042	.00721	122.40	53.12	.01766	1.00468	.6977
160.	1.3565	2616.5	.03428	.9050	.00628	136.86	58.24	.02210	1.00409	.6994
180.	1.2053	2943.4	.03429	.9053	.00557	147.94	63.15	.02697	1.00364	.6994
200.	1.0847	3225.0	.03492	.9054	.00500	156.98	67.87	.03230	1.00327	.6974
220.	.9861	3480.3	.03582	.9053	.00454	164.91	72.45	.03809	1.00297	.6943
240.	.9040	3724.8	.03674	.9052	.00416	172.33	76.88	.04430	1.00273	.6912
260.	.8346	3969.2	.03756	.9051	.00384	179.57	81.20	.05085	1.00252	.6887
280.	.7751	4218.1	.03823	.9049	.00356	186.80	85.41	.05774	1.00234	.6870
300.	.7236	4473.8	.03874	.9047	.00332	194.09	89.52	.06495	1.00218	.6858
350.	.6206	5143.7	.03948	.9043	.00285	212.67	99.44	.08423	1.00187	.6849
400.	.5432	5843.3	.03976	.9039	.00249	231.54	108.90	.10538	1.00164	.6848
450.	.4830	6562.7	.03981	.9035	.00222	250.36	117.97	.12835	1.00146	.6850
500.	.4349	7287.3	.03982	.9032	.00199	268.94	126.73	.15321	1.00131	.6847
550.	.3955	8018.8	.03977	.9030	.00181	287.18	135.20	.17983	1.00119	.6844
600.	.3626	8755.6	.03969	.9028	.00166	305.10	143.42	.20815	1.00109	.6841
700.	.3109	10250.3	.03946	.9024	.00143	340.23	159.24	.26968	1.00094	.6837
800.	.2721	11784.6	.03911	.9021	.00125	374.91	174.36	.33743	1.00082	.6836
900.	.2420	13369.0	.03863	.9019	.00111	409.65	188.90	.41113	1.00073	.6836
1000.	.2178	15011.1	.03806	.9017	.00100	444.74	202.96	.49058	1.00066	.6838
1200.	.1816	18469.9	.03674	.9014	.00083	511.13	229.88	.65948	1.00055	.6911
1400.	.1557	22156.9	.03536	.9012	.00071	583.43	255.50	.85373	1.00047	.6921
1600.	.1362	26009.5	.03410	.9011	.00062	656.51	280.05	1.06853	1.00041	.6926
1800.	.1211	30086.2	.03286	.9009	.00055	733.73	303.67	1.30629	1.00036	.6911
2000.	.1090	34730.5	.03129	.9006	.00050	828.18	326.45	1.57655	1.00033	.6840
2200.	.0990	40633.7	.02900	.8999	.00045	966.29	344.97	1.90207	1.00030	.6594
2400.	.0906	49006.5	.02575	.8983	.00042	1193.59	366.51	2.31806	1.00027	.6282
2600.	.0833	61598.6	.02174	.8949	.00039	1575.44	387.92	2.85642	1.00025	.5867
2800.	.0768	80566.3	.01757	.8884	.00036	2192.17	409.60	3.52401	1.00023	.5446
3000.	.0708	108142.4	.01385	.8774	.00034	3127.32	432.10	4.29912	1.00021	.5109

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.95 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	14.117	.01290	1.2311	.9342	-308.6	-296.3	4.988	4.72	6.38	1290.
	15.	.01301	1.1536	.9337	-302.8	-290.5	5.389	4.90	6.82	1267.
	16.	.01315	1.0684	.9199	-295.9	-283.5	5.843	5.08	7.28	1237.
	17.	.01331	1.0007	.9041	-288.6	-275.9	6.298	5.26	7.72	1212.
	18.	.01347	.9367	.8894	-280.8	-268.0	6.753	5.43	8.19	1189.
	19.	.01365	.8749	.8742	-272.5	-259.6	7.209	5.58	8.67	1166.
	20.	.01385	.8106	.8577	-263.8	-250.6	7.667	5.71	9.19	1142.
	21.	.01406	.7472	.8393	-254.5	-241.2	8.128	5.82	9.74	1118.
	22.	.01429	.6819	.8189	-244.7	-231.1	8.594	5.92	10.34	1091.
	23.	.01455	.6165	.7959	-234.3	-220.5	9.069	6.00	11.01	1063.
	24.	.01484	.5484	.7692	-223.2	-209.1	9.554	6.07	11.78	1031.
	25.	.01517	.4823	.7384	-211.3	-196.9	10.051	6.13	12.64	997.
	26.	.01556	.4145	.7027	-198.5	-183.7	10.567	6.18	13.57	958.
	27.	.01600	.3443	.6614	-184.6	-169.4	11.106	6.23	15.02	911.
	28.	.01655	.2762	.6142	-169.4	-153.6	11.681	6.29	16.76	858.
	29.	.01724	.2090	.5606	-152.1	-135.7	12.309	6.36	19.32	797.
	30.	.01820	.1401	.4968	-131.6	-114.3	13.035	6.47	23.98	721.
*	30.914	.01964	.0734	.4205	-106.9	-88.3	13.889	6.64	35.36	625.
*	30.914	.07532	.0246	.0719	92.7	164.2	22.061	7.79	44.58	376.
	31.	.07699	.0268	.0699	95.4	168.6	22.201	7.73	41.15	378.
	32.	.08934	.0441	.0576	115.8	200.7	23.221	7.32	26.52	400.
	33.	.09881	.0568	.0506	130.7	224.6	23.957	7.11	21.60	416.
	34.	.10700	.0675	.0458	143.1	244.8	24.559	6.90	18.99	431.
	36.	.12141	.0856	.0393	164.3	279.6	25.557	6.66	16.24	457.
	38.	.13435	.1013	.0349	182.9	310.5	26.393	6.55	14.79	478.
	40.	.14642	.1155	.0316	200.1	339.2	27.127	6.48	13.90	498.
	42.	.15789	.1287	.0290	216.3	366.3	27.790	6.44	13.29	515.
	44.	.16894	.1412	.0269	232.0	392.5	28.398	6.42	12.85	532.
	46.	.17967	.1531	.0251	247.1	417.8	28.961	6.41	12.52	547.
	48.	.19014	.1646	.0236	262.0	442.6	29.489	6.41	12.27	562.
	50.	.20040	.1758	.0223	276.6	466.9	29.985	6.41	12.07	575.
	52.	.21049	.1866	.0211	291.0	490.9	30.456	6.43	11.92	588.
	56.	.23027	.2075	.0191	319.4	538.2	31.332	6.49	11.72	612.
	60.	.24963	.2276	.0175	347.7	584.9	32.137	6.58	11.63	634.
	65.	.27340	.2521	.0159	383.2	643.0	33.067	6.76	11.63	659.
	70.	.29681	.2758	.0146	419.4	701.3	33.932	6.99	11.74	680.
	75.	.31995	.2991	.0135	456.6	760.5	34.748	7.29	11.94	700.
	80.	.34289	.3220	.0125	495.1	820.9	35.527	7.64	12.21	718.
	90.	.38829	.3669	.0110	577.4	946.3	37.004	8.43	12.90	749.
	100.	.43326	.4111	.0098	667.6	1079.2	38.403	9.29	13.69	778.
	110.	.47789	.4546	.0089	766.1	1220.0	39.743	10.13	14.46	806.
	120.	.52231	.4977	.0081	872.0	1368.2	41.032	10.85	15.15	834.
	130.	.56655	.5405	.0074	984.3	1522.5	42.267	11.42	15.69	862.
	140.	.61066	.5830	.0069	1101.4	1681.5	43.445	11.83	16.08	890.
	160.	.69859	.6676	.0060	1343.9	2007.6	45.621	12.22	16.44	947.
	180.	.78625	.7516	.0053	1589.4	2336.4	47.558	12.20	16.39	1005.
	200.	.87372	.8353	.0048	1831.8	2661.8	49.272	11.95	16.13	1062.
	220.	.96105	.9187	.0043	2068.2	2981.2	50.795	11.64	15.81	1117.
	240.	1.04829	1.0020	.0040	2298.3	3294.2	52.156	11.34	15.50	1170.
	260.	1.13546	1.0851	.0037	2522.7	3601.4	53.386	11.08	15.23	1221.
	280.	1.22257	1.1681	.0034	2742.4	3903.9	54.507	10.88	15.03	1270.
	300.	1.30958	1.2510	.0032	2958.8	4202.9	55.539	10.73	14.87	1317.
	350.	1.52705	1.4580	.0027	3489.4	4940.1	57.811	10.51	14.65	1425.
	400.	1.74439	1.6647	.0024	4012.8	5670.0	59.761	10.43	14.56	1525.
	450.	1.96165	1.8713	.0021	4533.3	6396.9	61.475	10.41	14.54	1617.
	500.	2.17887	2.0778	.0019	5053.9	7123.8	63.005	10.40	14.53	1704.
	550.	2.39604	2.2842	.0017	5574.1	7850.3	64.390	10.41	14.54	1786.
	600.	2.61319	2.4906	.0016	6095.2	8577.7	65.655	10.43	14.55	1865.
	700.	3.04744	2.9032	.0014	7140.3	10035.3	67.903	10.48	14.61	2011.
	800.	3.48165	3.3158	.0012	8192.9	11500.5	69.858	10.57	14.70	2147.
	900.	3.91584	3.7283	.0011	9256.3	12976.4	71.595	10.70	14.82	2273.
	1000.	4.35000	4.1408	.0010	10333.6	14466.1	73.167	10.86	14.98	2390.
	1200.	5.21831	4.9658	.0008	12543.9	17501.3	75.920	11.24	15.37	2605.
	1400.	6.08663	5.7907	.0007	14836.6	20618.9	78.327	11.68	15.80	2799.
	1600.	6.95493	6.6156	.0006	17216.3	23823.5	80.444	12.11	16.24	2978.
	1800.	7.82359	7.4404	.0005	19688.7	27121.1	82.348	12.56	16.69	3144.
	2000.	8.69370	8.2653	.0005	22275.1	30534.2	84.211	13.19	17.34	3297.
	2200.	9.56844	9.0902	.0004	25023.3	34113.3	86.589	14.22	18.44	3433.
	2400.	10.45498	9.9150	.0004	28056.5	37988.8	89.320	16.00	20.38	3553.
	2600.	11.36694	10.7398	.0004	31578.5	42377.1	92.378	18.97	23.67	3660.
	2800.	12.32689	11.5647	.0003	35891.1	47601.6	95.708	23.56	28.85	3762.
	3000.	13.36856	12.3895	.0003	41397.1	54097.2	99.247	30.15	36.48	3868.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

.95 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DV)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)/V_P$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.117	77.5486	652.3	.25528	95.4704	.00978	76.49	260.68	.00056	1.25345	2.1752
15.	76.8546	647.2	.24811	88.6581	.01053	84.13	232.71	.00058	1.25101	1.8855
16.	76.0277	642.5	.23797	81.2251	.01133	90.33	207.29	.00059	1.24810	1.6700
17.	75.1411	642.3	.22861	75.1966	.01202	94.48	186.55	.00059	1.24499	1.5248
18.	74.2121	640.0	.22078	69.5138	.01279	97.47	169.51	.00058	1.24174	1.4239
19.	73.2363	635.5	.21407	64.0768	.01364	99.28	155.23	.00056	1.23832	1.3557
20.	72.2077	627.0	.20815	58.5320	.01465	100.90	143.04	.00055	1.23473	1.3025
21.	71.1182	616.4	.20275	53.1417	.01579	102.78	132.45	.00053	1.23094	1.2545
22.	69.9576	602.4	.19773	47.7049	.01717	103.90	123.09	.00052	1.22690	1.2251
23.	68.7125	585.9	.19294	42.3579	.01879	104.33	114.67	.00050	1.22259	1.2100
24.	67.3636	565.7	.18806	36.9406	.02082	104.12	106.97	.00047	1.21792	1.2101
25.	65.8984	543.9	.18283	31.7796	.02323	103.32	99.83	.00045	1.21286	1.2210
26.	64.2873	518.4	.17694	26.6442	.02637	101.89	93.09	.00042	1.20732	1.2492
27.	62.4892	488.4	.16993	21.5143	.03074	99.85	86.61	.00038	1.20115	1.3025
28.	60.4323	455.5	.16158	16.6892	.03680	97.11	80.21	.00035	1.19412	1.3846
29.	58.0037	417.9	.15184	12.1234	.04624	93.52	73.70	.00030	1.18586	1.5228
30.	54.9325	371.5	.13984	7.6951	.06456	88.64	66.67	.00024	1.17546	1.8039
* 30.914	50.9105	314.4	.12437	3.7385	.11248	85.77	58.95	.00017	1.16194	2.4305
* 30.914	13.2772	202.8	.06955	.3265	.22031	45.46	20.72	.00028	1.04058	2.0364
31.	12.9879	205.3	.06965	.3487	.20041	43.92	20.61	.00030	1.03969	1.9312
32.	11.1936	227.3	.07023	.4932	.11669	37.80	20.29	.00046	1.03414	1.4237
33.	10.1208	245.7	.07029	.5750	.08793	36.00	20.35	.00059	1.03083	1.2213
34.	9.3462	261.6	.07101	.6307	.07259	35.28	20.55	.00072	1.02845	1.1060
36.	8.2364	291.4	.07160	.7051	.05574	35.07	21.12	.00094	1.02504	.9778
38.	7.4430	319.6	.07164	.7540	.04629	35.53	21.79	.00116	1.02261	.9072
40.	6.8297	346.8	.07146	.7889	.04008	36.29	22.50	.00138	1.02073	.8618
42.	6.3334	373.4	.07116	.8153	.03560	37.21	23.24	.00159	1.01921	.8301
44.	5.9192	399.4	.07081	.8359	.03218	38.23	23.98	.00181	1.01795	.8063
46.	5.5658	425.0	.07042	.8524	.02946	39.32	24.73	.00203	1.01687	.7877
48.	5.2594	450.4	.07000	.8659	.02724	40.45	25.48	.00226	1.01594	.7728
50.	4.9901	475.7	.06954	.8770	.02538	41.62	26.22	.00249	1.01512	.7606
52.	4.7508	501.1	.06904	.8864	.02379	42.82	26.96	.00272	1.01439	.7506
56.	4.3428	552.3	.06786	.9010	.02122	45.29	28.42	.00320	1.01315	.7355
60.	4.0060	605.0	.06646	.9119	.01922	47.88	29.85	.00370	1.01212	.7248
65.	3.6577	674.4	.06432	.9219	.01724	51.50	31.60	.00436	1.01106	.7135
70.	3.3692	748.8	.06182	.9293	.01568	55.16	33.31	.00502	1.01019	.7089
75.	3.1255	829.3	.05907	.9348	.01440	58.69	34.97	.00566	1.00945	.7114
80.	2.9164	916.3	.05619	.9391	.01333	62.46	36.60	.00631	1.00881	.7154
90.	2.5754	1109.4	.05059	.9450	.01163	72.20	39.74	.00782	1.00778	.7101
100.	2.3081	1324.0	.04572	.9488	.01034	81.96	42.76	.00934	1.00697	.7140
110.	2.0925	1552.9	.04182	.9512	.00931	93.07	44.95	.01107	1.00632	.6986
120.	1.9146	1785.1	.03893	.9529	.00849	103.60	47.76	.01286	1.00578	.6932
130.	1.7651	2012.5	.03690	.9540	.00780	113.56	50.48	.01476	1.00533	.6975
140.	1.6376	2229.3	.03554	.9547	.00721	122.44	53.13	.01674	1.00494	.6979
160.	1.4315	2616.7	.03431	.9556	.00628	136.89	58.25	.02094	1.00432	.6995
180.	1.2719	2943.8	.03431	.9559	.00557	147.97	63.16	.02555	1.00384	.6995
200.	1.1445	3225.7	.03495	.9560	.00500	157.00	67.88	.03061	1.00345	.6975
220.	1.0405	3481.1	.03584	.9559	.00454	164.93	72.45	.03610	1.00314	.6944
240.	.9539	3725.7	.03676	.9558	.00416	172.35	76.89	.04198	1.00288	.6913
260.	.8807	3970.2	.03758	.9556	.00384	179.58	81.20	.04819	1.00266	.6888
280.	.8180	4219.2	.03824	.9554	.00356	186.81	85.41	.05472	1.00247	.6870
300.	.7636	4475.0	.03876	.9553	.00332	194.10	89.53	.06154	1.00230	.6858
350.	.6549	5144.9	.03949	.9548	.00285	212.68	99.44	.07981	1.00197	.6849
400.	.5733	5844.6	.03977	.9543	.00249	231.54	108.90	.09986	1.00173	.6848
450.	.5098	6564.0	.03982	.9539	.00221	250.37	117.98	.12162	1.00154	.6850
500.	.4590	7288.7	.03982	.9536	.00199	268.94	126.73	.14518	1.00138	.6847
550.	.4174	8020.2	.03977	.9533	.00181	287.19	135.20	.17040	1.00126	.6844
600.	.3827	8757.0	.03970	.9531	.00166	305.11	143.43	.19723	1.00115	.6841
700.	.3281	10251.8	.03947	.9527	.00142	340.24	159.24	.25553	1.00099	.6837
800.	.2872	11786.1	.03911	.9524	.00125	374.92	174.36	.31971	1.00087	.6836
900.	.2554	13370.5	.03864	.9521	.00111	409.65	188.90	.38954	1.00077	.6836
1000.	.2299	15012.7	.03806	.9519	.00100	444.74	202.96	.46481	1.00069	.6838
1200.	.1916	18471.5	.03675	.9516	.00083	511.13	229.88	.62482	1.00058	.6911
1400.	.1643	22158.4	.03536	.9514	.00071	583.43	255.50	.80885	1.00050	.6921
1600.	.1438	26010.4	.03410	.9512	.00062	656.47	280.05	1.01234	1.00043	.6926
1800.	.1278	30082.6	.03287	.9510	.00055	733.52	303.67	1.23748	1.00039	.6912
2000.	.1150	34710.2	.03131	.9507	.00050	827.32	326.45	1.49307	1.00035	.6843
2200.	.1045	40565.8	.02906	.9500	.00045	963.62	344.97	1.80017	1.00031	.6601
2400.	.0956	48827.8	.02586	.9484	.00042	1186.72	366.50	2.19161	1.00029	.6294
2600.	.0880	61200.4	.02190	.9448	.00039	1560.30	387.89	2.69775	1.00027	.5884
2800.	.0811	79786.6	.01776	.9382	.00036	2162.72	409.54	3.32614	1.00024	.5464
3000.	.0748	106772.3	.01404	.9268	.00034	3075.78	431.98	4.05742	1.00023	.5124

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

1.00 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	14.133	.01289	1.2344	.9347	-308.5	-295.7	4.990	4.72	6.38	1292.
	15.	.01300	1.1600	.9343	-302.9	-289.9	5.382	4.90	6.80	1270.
	16.	.01315	1.0735	.9214	-296.1	-282.9	5.835	5.08	7.27	1239.
	17.	.01330	1.0056	.9056	-288.7	-275.4	6.290	5.26	7.71	1214.
	18.	.01347	.9414	.8908	-280.9	-267.5	6.744	5.43	8.18	1191.
	19.	.01364	.8798	.8757	-272.7	-259.0	7.199	5.57	8.66	1169.
	20.	.01384	.8155	.8593	-264.0	-250.1	7.656	5.70	9.17	1145.
	21.	.01405	.7523	.8409	-254.7	-240.7	8.117	5.82	9.71	1121.
	22.	.01428	.6871	.8205	-245.0	-230.7	8.582	5.92	10.31	1094.
	23.	.01454	.6219	.7976	-234.6	-220.1	9.055	6.00	10.97	1066.
	24.	.01482	.5539	.7713	-223.5	-208.7	9.538	6.07	11.74	1035.
	25.	.01515	.4883	.7407	-211.7	-196.6	10.034	6.13	12.58	1001.
	26.	.01553	.4207	.7056	-199.0	-183.5	10.547	6.18	13.59	962.
	27.	.01597	.3531	.6648	-185.3	-169.3	11.082	6.23	14.84	917.
	28.	.01650	.2850	.6185	-170.2	-153.7	11.650	6.29	16.52	865.
	29.	.01717	.2166	.5658	-153.1	-136.0	12.271	6.36	19.00	804.
	30.	.01809	.1485	.5041	-133.2	-115.1	12.979	6.45	23.26	731.
	31.	.01957	.0784	.4243	-107.2	-87.6	13.878	6.63	33.89	633.
*	31.248	.02016	.0594	.3982	-98.7	-78.5	14.171	6.71	40.61	600.
*	31.248	.06965	.0213	.0788	87.6	157.2	21.719	7.93	52.16	374.
	32.	.08043	.0367	.0654	107.0	187.4	22.675	7.50	31.66	393.
	33.	.09052	.0511	.0561	124.2	214.7	23.515	7.22	23.86	411.
	34.	.09887	.0627	.0502	137.8	236.6	24.170	6.97	20.33	427.
	36.	.11320	.0818	.0426	160.2	273.4	25.221	6.70	16.91	454.
	38.	.12587	.0982	.0375	179.5	305.4	26.086	6.57	15.22	477.
	40.	.13759	.1128	.0339	197.1	334.7	26.839	6.49	14.20	497.
	42.	.14869	.1264	.0310	213.7	362.4	27.514	6.45	13.52	515.
	44.	.15934	.1391	.0287	229.6	388.9	28.131	6.43	13.03	531.
	46.	.16965	.1513	.0267	245.0	414.6	28.702	6.42	12.67	547.
	48.	.17971	.1629	.0251	260.0	439.7	29.235	6.41	12.39	561.
	50.	.18954	.1742	.0236	274.7	464.2	29.736	6.42	12.18	575.
	52.	.19921	.1852	.0224	289.2	488.4	30.211	6.44	12.02	588.
	56.	.21813	.2063	.0203	317.9	536.0	31.093	6.49	11.79	612.
	60.	.23663	.2267	.0185	346.3	582.9	31.902	6.59	11.69	634.
	65.	.25931	.2513	.0168	382.0	641.3	32.836	6.76	11.68	659.
	70.	.28164	.2752	.0154	418.3	699.9	33.705	7.00	11.78	681.
	75.	.30370	.2986	.0142	455.5	759.2	34.524	7.29	11.97	700.
	80.	.32554	.3217	.0132	494.2	819.7	35.304	7.64	12.24	718.
	90.	.36878	.3668	.0116	576.6	945.4	36.783	8.44	12.92	749.
	100.	.41157	.4111	.0103	666.9	1078.5	38.185	9.30	13.70	778.
	110.	.45403	.4547	.0093	765.4	1219.5	39.526	10.13	14.48	806.
	120.	.49627	.4979	.0085	871.5	1367.7	40.816	10.85	15.16	834.
	130.	.53834	.5407	.0078	983.8	1522.1	42.052	11.42	15.70	862.
	140.	.58028	.5833	.0073	1100.9	1681.2	43.230	11.84	16.09	891.
	160.	.66386	.6680	.0063	1343.5	2007.4	45.407	12.22	16.44	948.
	180.	.74718	.7521	.0056	1589.1	2336.3	47.345	12.20	16.39	1005.
	200.	.83031	.8358	.0050	1831.5	2661.8	49.059	11.95	16.14	1062.
	220.	.91330	.9193	.0046	2068.0	2981.3	50.582	11.64	15.81	1117.
	240.	.99620	1.0026	.0042	2298.1	3294.3	51.944	11.34	15.50	1171.
	260.	1.07902	1.0858	.0039	2522.5	3601.5	53.173	11.08	15.23	1222.
	280.	1.16179	1.1688	.0036	2742.3	3904.0	54.295	10.88	15.03	1271.
	300.	1.24446	1.2517	.0033	2958.6	4203.1	55.327	10.73	14.87	1317.
	350.	1.45108	1.4588	.0029	3489.2	4940.3	57.599	10.51	14.65	1426.
	400.	1.65757	1.6655	.0025	4012.7	5670.3	59.550	10.43	14.56	1525.
	450.	1.86398	1.8721	.0022	4533.3	6397.2	61.263	10.41	14.54	1617.
	500.	2.07033	2.0786	.0020	5053.8	7124.2	62.794	10.40	14.53	1704.
	550.	2.27666	2.2851	.0018	5574.0	7850.7	64.178	10.41	14.54	1786.
	600.	2.48295	2.4914	.0017	6095.1	8578.1	65.443	10.43	14.55	1865.
	700.	2.89550	2.9041	.0014	7140.2	10035.7	67.691	10.48	14.61	2012.
	800.	3.30800	3.3167	.0013	8192.9	11500.9	69.646	10.57	14.70	2147.
	900.	3.72048	3.7292	.0011	9256.3	12976.8	71.383	10.70	14.82	2273.
	1000.	4.13294	4.1417	.0010	10333.6	14466.5	72.955	10.86	14.98	2391.
	1200.	4.95784	4.9667	.0008	12543.9	17501.7	75.709	11.24	15.37	2605.
	1400.	5.78271	5.7916	.0007	14836.6	20619.3	78.116	11.68	15.80	2799.
	1600.	6.60763	6.6165	.0006	17216.3	23823.9	80.232	12.11	16.24	2978.
	1800.	7.43284	7.4413	.0006	19688.4	27121.2	82.136	12.56	16.69	3145.
	2000.	8.25941	8.2662	.0005	22273.7	30533.1	83.999	13.18	17.33	3297.
	2200.	9.09025	9.0910	.0005	25018.3	34108.5	86.375	14.19	18.41	3434.
	2400.	9.93203	9.9159	.0004	28042.3	37974.3	89.102	15.94	20.31	3554.
	2600.	10.79735	10.7407	.0004	31544.2	42341.5	92.152	18.84	23.52	3661.
	2800.	11.70709	11.5656	.0004	35818.1	47525.2	95.466	23.32	28.58	3763.
	3000.	12.69252	12.3904	.0003	41256.5	53949.0	98.980	29.75	36.03	3869.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

1.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial V)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)/V_P$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.133	77.5763	654.0	.25522	95.7614	.00976	76.69	261.99	.00056	1.25355	2.1723
15.	76.8975	649.7	.24818	89.1999	.01047	84.18	233.50	.00058	1.25116	1.8875
16.	76.0734	644.3	.23827	81.6612	.01128	90.41	207.98	.00059	1.24826	1.6724
17.	75.1902	644.1	.22890	75.6113	.01198	94.58	187.17	.00059	1.24516	1.5266
18.	74.2648	641.8	.22106	69.9161	.01274	97.58	170.06	.00058	1.24192	1.4251
19.	73.2929	637.5	.21433	64.4858	.01358	99.40	155.74	.00056	1.23852	1.3564
20.	72.2689	629.1	.20842	58.9352	.01458	101.04	143.51	.00055	1.23495	1.3027
21.	71.1846	618.6	.20301	53.5525	.01570	102.94	132.90	.00054	1.23117	1.2541
22.	70.0303	604.8	.19798	48.1167	.01705	104.07	123.52	.00052	1.22716	1.2241
23.	68.7931	588.6	.19320	42.7839	.01864	104.53	115.09	.00050	1.22286	1.2083
24.	67.4541	568.5	.18834	37.3608	.02064	104.35	107.38	.00047	1.21823	1.2077
25.	66.0015	547.2	.18315	32.2260	.02298	103.58	100.25	.00045	1.21322	1.2173
26.	64.4069	522.0	.17735	27.0974	.02604	102.18	93.53	.00042	1.20773	1.2442
27.	62.6325	493.8	.17046	22.1181	.03006	100.19	87.08	.00039	1.20164	1.2900
28.	60.6157	461.3	.16232	17.2762	.03580	97.53	80.74	.00035	1.19475	1.3671
29.	58.2362	423.5	.15281	12.6128	.04486	94.04	74.28	.00031	1.18665	1.5007
30.	55.2770	378.6	.14128	8.2063	.06142	89.37	67.41	.00025	1.17662	1.7544
31.	51.0906	320.0	.12529	4.0067	.10589	85.69	59.29	.00018	1.16254	2.3450
* 31.248	49.6094	300.4	.11970	2.9453	.13519	86.23	56.77	.00015	1.15759	2.6737
* 31.248	14.3567	202.2	.06923	.3054	.25798	49.56	21.45	.00024	1.04393	2.2578
32.	12.4337	220.6	.07010	.4557	.14350	40.71	20.84	.00037	1.03797	1.6202
33.	11.0478	240.2	.07027	.5646	.09932	37.54	20.72	.00051	1.03369	1.3169
34.	10.1147	256.8	.07115	.6340	.07916	36.34	20.83	.00064	1.03081	1.1650
36.	8.8336	287.3	.07188	.7230	.05886	35.75	21.32	.00086	1.02687	1.0083
38.	7.9444	316.0	.07196	.7798	.04815	36.05	21.95	.00107	1.02414	.9263
40.	7.2677	343.6	.07177	.8199	.04132	36.72	22.64	.00128	1.02207	.8752
42.	6.7254	370.5	.07145	.8499	.03648	37.58	23.35	.00149	1.02041	.8401
44.	6.2759	396.8	.07108	.8731	.03284	38.56	24.09	.00170	1.01904	.8142
46.	5.8943	422.6	.07068	.8917	.02998	39.62	24.83	.00191	1.01787	.7941
48.	5.5647	448.2	.07024	.9067	.02765	40.73	25.57	.00213	1.01687	.7781
50.	5.2758	473.7	.06976	.9192	.02571	41.88	26.31	.00235	1.01599	.7651
52.	.0198	499.2	.06924	.9296	.02407	43.06	27.04	.00257	1.01521	.7545
56.	4.5844	550.7	.06804	.9459	.02141	45.50	28.49	.00303	1.01388	.7383
60.	4.2261	603.6	.06662	.9580	.01936	48.08	29.91	.00350	1.01279	.7270
65.	3.8564	673.1	.06447	.9691	.01734	51.68	31.66	.00413	1.01167	.7152
70.	3.5506	747.7	.06195	.9772	.01575	55.32	33.36	.00476	1.01074	.7102
75.	3.2928	828.3	.05918	.9834	.01445	58.83	35.02	.00537	1.00996	.7126
80.	3.0718	915.3	.05630	.9881	.01337	62.59	36.64	.00599	1.00929	.7163
90.	2.7117	1108.6	.05067	.9946	.01166	72.32	39.78	.00743	1.00819	.7107
100.	2.4297	1323.3	.04579	.9988	.01035	82.08	42.79	.00888	1.00734	.7144
110.	2.2025	1552.4	.04187	1.0014	.00933	93.13	44.96	.01051	1.00665	.6990
120.	2.0150	1784.8	.03898	1.0032	.00849	103.66	47.77	.01222	1.00608	.6985
130.	1.8576	2012.3	.03694	1.0045	.00780	113.61	50.49	.01403	1.00561	.6977
140.	1.7233	2229.2	.03557	1.0053	.00722	122.48	53.14	.01590	1.00520	.6981
160.	1.5063	2617.0	.03434	1.0062	.00628	136.92	58.26	.01990	1.00455	.6997
180.	1.3384	2944.3	.03433	1.0066	.00557	148.00	63.16	.02428	1.00404	.6997
200.	1.2044	3226.4	.03497	1.0067	.00500	157.02	67.89	.02909	1.00363	.6976
220.	1.0949	3481.9	.03586	1.0066	.00454	164.95	72.46	.03430	1.00330	.6945
240.	1.0038	3726.7	.03678	1.0064	.00416	172.36	76.89	.03989	1.00303	.6913
260.	.9268	3971.2	.03759	1.0062	.00384	179.60	81.21	.04579	1.00280	.6889
280.	.8607	4220.3	.03826	1.0060	.00356	186.82	85.42	.05200	1.00260	.6871
300.	.8036	4476.1	.03877	1.0059	.00332	194.11	89.53	.05848	1.00242	.6859
350.	.6891	5146.2	.03950	1.0053	.00285	212.69	99.44	.07584	1.00208	.6850
400.	.6033	5845.9	.03978	1.0048	.00249	231.55	108.90	.09489	1.00182	.6848
450.	.5365	6565.4	.03983	1.0044	.00221	250.38	117.98	.11556	1.00162	.6851
500.	.4830	7290.1	.03983	1.0040	.00199	268.95	126.73	.13795	1.00146	.6847
550.	.4392	8021.6	.03978	1.0037	.00181	287.19	135.20	.16191	1.00132	.6844
600.	.4027	8758.5	.03971	1.0034	.00166	305.11	143.43	.18740	1.00121	.6841
700.	.3454	10253.3	.03947	1.0030	.00142	340.24	159.25	.24279	1.00104	.6837
800.	.3023	11787.6	.03912	1.0026	.00125	374.92	174.36	.30376	1.00091	.6836
900.	.2688	13372.1	.03864	1.0023	.00111	409.66	188.90	.37011	1.00081	.6836
1000.	.2420	15014.3	.03806	1.0021	.00100	444.75	202.96	.44162	1.00073	.6838
1200.	.2017	18473.1	.03675	1.0018	.00083	511.13	229.88	.59363	1.00061	.6912
1400.	.1729	22160.0	.03536	1.0015	.00071	583.42	255.50	.76847	1.00052	.6922
1600.	.1513	26011.3	.03410	1.0013	.00062	656.44	280.05	.96177	1.00046	.6927
1800.	.1345	30079.4	.03288	1.0011	.00055	733.32	303.67	1.17555	1.00041	.6912
2000.	.1211	34691.6	.03134	1.0008	.00050	826.53	326.45	1.41797	1.00036	.6845
2200.	.1100	40503.2	.02912	1.0001	.00045	961.15	344.97	1.70858	1.00033	.6607
2400.	.1007	48662.8	.02597	.9984	.00042	1180.38	366.49	2.07810	1.00030	.6306
2600.	.0926	60832.5	.02205	.9948	.00039	1546.31	387.87	2.55546	1.00028	.5900
2800.	.0854	79065.7	.01793	.9879	.00036	2135.49	409.48	3.14874	1.00026	.5481
3000.	.0788	105504.7	.01422	.9762	.00034	3028.08	431.86	3.84065	1.00024	.5138

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

1.292800 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	14.229	.01286	1.2537	.9367	-308.4	-291.8	4.996	4.73	6.38	1300.
	15.	.01296	1.1970	.9378	-303.5	-286.7	5.343	4.89	6.74	1285.
	16.	.01310	1.1028	.9299	-296.7	-279.7	5.793	5.08	7.23	1253.
	17.	.01325	1.0336	.9139	-289.4	-272.3	6.245	5.25	7.66	1228.
	18.	.01341	.9688	.8991	-281.7	-264.4	6.695	5.42	8.12	1205.
	19.	.01358	.9102	.8842	-273.6	-256.1	7.145	5.56	8.57	1184.
	20.	.01377	.8467	.8680	-265.0	-247.2	7.599	5.69	9.07	1161.
	21.	.01397	.7813	.8499	-256.0	-237.9	8.054	5.81	9.60	1136.
	22.	.01420	.7166	.8300	-246.4	-228.0	8.513	5.91	10.17	1111.
	23.	.01444	.6530	.8077	-236.3	-217.6	8.978	5.99	10.79	1084.
	24.	.01471	.5882	.7826	-225.5	-206.5	9.451	6.06	11.47	1055.
	25.	.01502	.5232	.7537	-214.0	-194.6	9.936	6.12	12.25	1023.
	26.	.01537	.4570	.7209	-201.8	-181.9	10.433	6.17	13.16	987.
	27.	.01577	.3916	.6835	-188.6	-168.3	10.948	6.22	14.23	946.
	28.	.01624	.3269	.6411	-174.4	-153.4	11.489	6.27	15.56	901.
	29.	.01682	.2603	.5941	-158.7	-136.9	12.066	6.33	17.45	847.
	30.	.01755	.1976	.5409	-141.0	-118.3	12.697	6.40	20.08	787.
	31.	.01856	.1349	.4787	-120.2	-96.2	13.422	6.50	24.64	715.
	32.	.02020	.0718	.3996	-93.1	-67.0	14.348	6.68	35.71	620.
*	32.976	.03128	-.0001	.1927	-5.6	34.9	17.461	9.88	-14527.49	348.
*	32.976	.03241	-.0001	.1868	-.1	41.8	17.671	9.80	-13235.63	351.
	33.	.03934	.0025	.1548	30.3	81.1	18.865	9.44	501.15	363.
	34.	.06012	.0298	.0915	93.8	171.6	21.578	7.72	42.28	404.
	36.	.07672	.0584	.0669	132.1	231.3	23.289	6.98	23.23	441.
	38.	.08886	.0793	.0559	157.4	272.3	24.400	6.72	18.54	468.
	40.	.09935	.0969	.0489	178.5	307.0	25.290	6.59	16.35	490.
	42.	.10894	.1126	.0439	197.5	338.3	26.054	6.53	15.07	510.
	44.	.11795	.1270	.0401	215.1	367.5	26.734	6.49	14.22	528.
	46.	.12654	.1405	.0369	231.8	395.4	27.353	6.47	13.63	544.
	48.	.13482	.1533	.0344	247.9	422.2	27.923	6.46	13.18	559.
	50.	.14286	.1655	.0322	263.5	448.2	28.454	6.46	12.85	574.
	52.	.15070	.1773	.0303	278.8	473.6	28.953	6.48	12.59	587.
	56.	.16594	.1999	.0272	308.7	523.2	29.872	6.53	12.23	612.
	60.	.18072	.2214	.0247	338.1	571.7	30.709	6.62	12.04	635.
	65.	.19875	.2471	.0223	374.7	631.6	31.668	6.78	11.95	660.
	70.	.21640	.2720	.0203	411.7	691.5	32.555	7.02	12.00	682.
	75.	.23379	.2961	.0187	449.6	751.8	33.387	7.31	12.15	702.
	80.	.25096	.3198	.0173	488.7	813.1	34.179	7.65	12.39	720.
	90.	.28483	.3660	.0152	571.9	940.1	35.674	8.45	13.04	752.
	100.	.31826	.4111	.0135	662.8	1074.2	37.086	9.30	13.79	781.
	110.	.35137	.4553	.0122	761.8	1216.1	38.435	10.14	14.55	808.
	120.	.38425	.4990	.0111	868.2	1365.0	39.731	10.85	15.22	836.
	130.	.41697	.5423	.0102	980.9	1519.9	40.971	11.43	15.75	865.
	140.	.44956	.5853	.0094	1098.3	1679.4	42.152	11.84	16.13	893.
	160.	.51445	.6705	.0082	1341.3	2006.4	44.335	12.23	16.48	950.
	180.	.57907	.7551	.0073	1587.2	2335.8	46.275	12.20	16.42	1008.
	200.	.64351	.8392	.0065	1829.8	2661.8	47.992	11.96	16.16	1065.
	220.	.70781	.9229	.0059	2066.5	2981.6	49.516	11.64	15.83	1120.
	240.	.77202	1.0064	.0054	2296.8	3294.8	50.879	11.34	15.51	1173.
	260.	.83616	1.0897	.0050	2521.3	3602.3	52.110	11.08	15.25	1224.
	280.	.90024	1.1729	.0046	2741.2	3905.0	53.232	10.88	15.04	1273.
	300.	.96425	1.2560	.0043	2957.8	4204.3	54.265	10.73	14.88	1320.
	350.	1.12416	1.4633	.0037	3488.5	4941.9	56.538	10.51	14.56	1428.
	400.	1.28395	1.6702	.0032	4012.1	5672.0	58.489	10.43	14.57	1527.
	450.	1.44365	1.8769	.0029	4532.8	6399.2	60.203	10.41	14.54	1619.
	500.	1.60330	2.0835	.0026	5053.5	7126.2	61.734	10.40	14.53	1706.
	550.	1.76292	2.2900	.0024	5573.7	7852.8	63.119	10.41	14.54	1788.
	600.	1.92252	2.4964	.0022	6094.8	8580.3	64.383	10.43	14.55	1867.
	700.	2.24165	2.9091	.0018	7140.0	10038.0	66.632	10.48	14.61	2014.
	800.	2.56075	3.3218	.0016	8192.7	11503.2	68.587	10.57	14.70	2149.
	900.	2.87982	3.7343	.0014	9256.2	12979.2	70.324	10.70	14.83	2275.
	1000.	3.19888	4.1469	.0013	10333.5	14469.0	71.896	10.86	14.98	2392.
	1200.	3.83696	4.9718	.0011	12543.8	17504.2	74.650	11.24	15.37	2607.
	1400.	4.47502	5.7968	.0009	14836.5	20621.9	77.056	11.68	15.80	2801.
	1600.	5.11310	6.6217	.0008	17216.0	23826.2	79.173	12.11	16.23	2980.
	1800.	5.75139	7.4465	.0007	19686.8	27122.2	81.076	12.55	16.68	3146.
	2000.	6.39059	8.2714	.0006	22266.9	30528.7	82.936	13.13	17.28	3299.
	2200.	7.03271	9.0963	.0006	24994.9	34086.7	85.303	14.06	18.27	3438.
	2400.	7.68227	9.9211	.0005	27976.3	37907.9	88.011	15.64	19.98	3560.
	2600.	8.34784	10.7460	.0005	31385.1	42177.2	91.022	18.22	22.34	3669.
	2800.	9.04366	11.5708	.0005	35479.5	47171.1	94.267	22.20	27.32	3772.
	3000.	9.79099	12.3957	.0004	40604.3	53262.1	97.666	27.91	33.90	3877.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

1.292800 MPA ISOBAR

	TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DV)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)/V_P$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
*	14.229	77.7376	664.1	.25449	97.4607	.00961	77.85	262.81	.00056	1.25411	2.1545
	15.	77.1455	663.8	.24860	92.3420	.01016	84.50	238.11	.00058	1.25203	1.8998
	16.	76.3375	654.5	.23996	84.1885	.01105	90.83	212.01	.00059	1.24919	1.6873
	17.	75.4732	654.2	.23054	78.0093	.01172	95.10	190.76	.00059	1.24615	1.5374
	18.	74.5678	652.2	.22264	72.2386	.01245	98.19	173.31	.00058	1.24298	1.4327
	19.	73.6240	649.8	.21587	67.0094	.01319	100.11	158.77	.00057	1.23968	1.3597
	20.	72.6196	642.4	.20992	61.4904	.01412	101.84	146.28	.00056	1.23617	1.3025
	21.	71.5645	631.5	.20447	55.9166	.01520	103.83	135.51	.00054	1.23249	1.2526
	22.	70.4452	618.6	.19942	50.4817	.01644	105.08	126.02	.00053	1.22860	1.2197
	23.	69.2507	603.8	.19462	45.2201	.01786	105.66	117.53	.00051	1.22445	1.1997
	24.	67.9678	586.1	.18987	39.9775	.01958	105.62	109.81	.00049	1.22001	1.1929
	25.	66.5794	566.0	.18490	34.8312	.02164	105.01	102.67	.00046	1.21521	1.1974
	26.	65.0753	542.6	.17949	29.7379	.02424	103.82	96.02	.00044	1.21003	1.2167
	27.	63.4185	517.0	.17329	24.8318	.02753	102.08	89.69	.00041	1.20434	1.2502
	28.	61.5718	488.4	.16604	20.1288	.03185	99.77	83.56	.00037	1.19801	1.3029
	29.	59.4606	454.6	.15784	15.4766	.03838	96.80	77.47	.00034	1.19081	1.3965
	30.	56.9770	418.0	.14833	11.2605	.04803	93.03	71.26	.00029	1.18237	1.5379
	31.	53.8752	374.2	.13669	7.2696	.06585	87.74	64.60	.00024	1.17190	1.8140
	32.	49.5003	317.8	.12082	3.5564	.11236	85.51	56.75	.00017	1.15723	2.3699
*	32.976	31.9741	198.6	.06097	-.0026	-73.14943	-5797.64	35.91	.00004	1.09971	8.9976
*	32.976	30.8504	199.5	.06180	-.0028	-66.33339	-5279.20	34.93	.00005	1.09609	8.7586
	33.	25.4217	204.8	.06448	.0633	2.44668	241.61	30.45	.00007	1.07873	6.3153
	34.	16.6336	228.8	.07129	.4952	.18481	50.08	24.13	.00026	1.05103	2.0376
	36.	13.0352	264.3	.07355	.7615	.08789	41.38	23.04	.00049	1.03983	1.2929
	38.	11.2542	296.0	.07395	.8927	.06263	39.82	23.16	.00069	1.03432	1.0785
	40.	10.0653	325.9	.07374	.9753	.05017	39.65	23.60	.00087	1.03066	.9731
	42.	9.1792	354.5	.07332	1.0334	.04250	40.03	24.17	.00104	1.02793	.9096
	44.	8.4784	382.3	.07281	1.0767	.03720	40.69	24.80	.00121	1.02578	.8668
	46.	7.9028	409.5	.07227	1.1102	.03328	41.51	25.46	.00139	1.02402	.8356
	48.	7.4174	436.2	.07170	1.1370	.03023	42.45	26.14	.00156	1.02253	.8118
	50.	7.0001	462.7	.07111	1.1588	.02777	43.47	26.83	.00174	1.02125	.7931
	52.	6.6357	489.0	.07050	1.1768	.02575	44.54	27.53	.00192	1.02014	.7782
	56.	6.0264	541.9	.06912	1.2046	.02258	46.81	28.92	.00229	1.01828	.7559
	60.	5.5334	595.8	.06759	1.2248	.02020	49.26	30.30	.00266	1.01677	.7405
	65.	5.0315	666.3	.06533	1.2433	.01793	52.74	32.01	.00316	1.01524	.7252
	70.	4.6210	741.6	.06271	1.2567	.01618	56.29	33.68	.00365	1.01399	.7178
	75.	4.2774	822.8	.05986	1.2667	.01477	59.67	35.31	.00413	1.01295	.7192
	80.	3.9848	910.3	.05690	1.2743	.01361	63.38	36.91	.00462	1.01206	.7216
	90.	3.5109	1104.2	.05115	1.2849	.01180	73.05	40.02	.00575	1.01062	.7141
	100.	3.1421	1319.7	.04618	1.2916	.01045	82.75	43.01	.00687	1.00950	.7168
	110.	2.8460	1549.8	.04217	1.2959	.00939	93.50	45.06	.00813	1.00860	.7013
	120.	2.6025	1783.0	.03923	1.2987	.00853	103.98	47.85	.00945	1.00786	.7003
	130.	2.3983	2011.4	.03716	1.3007	.00783	113.89	50.57	.01086	1.00724	.6992
	140.	2.2244	2229.2	.03577	1.3020	.00724	122.73	53.21	.01231	1.00672	.6994
	150.	1.9438	2618.5	.03450	1.3034	.00629	137.12	58.31	.01541	1.00587	.7006
	180.	1.7269	2947.3	.03448	1.3039	.00557	148.16	63.20	.01881	1.00521	.7004
	200.	1.5540	3230.4	.03510	1.3040	.00500	157.16	67.92	.02254	1.00469	.6982
	220.	1.4128	3486.8	.03598	1.3039	.00454	165.06	72.49	.02658	1.00426	.6950
	240.	1.2953	3732.1	.03689	1.3036	.00416	172.46	76.92	.03090	1.00391	.6918
	260.	1.1959	3977.2	.03769	1.3033	.00383	179.69	81.23	.03548	1.00361	.6892
	280.	1.1108	4226.7	.03835	1.3029	.00356	186.90	85.44	.04028	1.00335	.6874
	300.	1.0371	4483.0	.03886	1.3026	.00332	194.18	89.55	.04531	1.00313	.6861
	350.	.8896	5153.6	.03958	1.3017	.00284	212.74	99.46	.05875	1.00268	.6851
	400.	.7788	5853.7	.03985	1.3008	.00249	231.60	108.91	.07350	1.00235	.6850
	450.	.6927	6573.5	.03989	1.3001	.00221	250.42	117.93	.08950	1.00209	.6851
	500.	.6237	7298.3	.03988	1.2995	.00199	268.98	126.74	.10683	1.00188	.6848
	550.	.5672	8030.0	.03983	1.2990	.00181	287.22	135.21	.12537	1.00171	.6845
	600.	.5202	8767.0	.03975	1.2985	.00166	305.14	143.43	.14510	1.00157	.6841
	700.	.4461	10262.1	.03951	1.2978	.00142	340.27	159.25	.18796	1.00134	.6837
	800.	.3905	11796.5	.03915	1.2972	.00125	374.94	174.37	.23515	1.00118	.6836
	900.	.3472	13381.2	.03867	1.2967	.00111	409.67	188.91	.28648	1.00105	.6836
	1000.	.3126	15023.5	.03809	1.2963	.00100	444.76	202.96	.34182	1.00094	.6838
	1200.	.2606	18482.6	.03677	1.2958	.00083	511.13	229.88	.45942	1.00079	.6912
	1400.	.2235	22169.5	.03538	1.2954	.00071	583.41	255.50	.59468	1.00067	.6922
	1600.	.1956	26017.5	.03412	1.2950	.00062	656.28	280.06	.74417	1.00059	.6927
	1800.	.1739	30066.8	.03292	1.2947	.00055	732.42	303.68	.90921	1.00052	.6915
	2000.	.1565	34607.6	.03145	1.2943	.00050	822.87	326.45	1.09531	1.00047	.6857
	2200.	.1422	40215.2	.02939	1.2934	.00045	949.70	344.95	1.31598	1.00043	.6636
	2400.	.1302	47899.8	.02646	1.2914	.00042	1150.93	366.45	1.59315	1.00039	.6361
	2600.	.1198	59126.8	.02278	1.2873	.00039	1481.37	387.76	1.94924	1.00036	.5978
	2800.	.1106	75718.1	.01881	1.2794	.00036	2008.94	409.22	2.39363	1.00033	.5566
	3000.	.1021	99603.9	.01512	1.2660	.00034	2805.93	431.33	2.91717	1.00031	.5212

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

1.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.296	.01285	1.2672	.9378	-308.3	-289.1	5.001	4.74	6.38	1306.
15.	.01293	1.2227	.9402	-303.8	-284.4	5.316	4.89	6.70	1295.
16.	.01307	1.1232	.9358	-297.1	-277.5	5.764	5.07	7.20	1263.
17.	.01321	1.0597	.9197	-289.9	-270.1	6.212	5.25	7.52	1240.
18.	.01337	.9938	.9049	-282.3	-262.3	6.660	5.41	8.06	1217.
19.	.01354	.9302	.8898	-274.3	-254.0	7.109	5.56	8.52	1194.
20.	.01372	.8675	.8738	-265.8	-245.2	7.559	5.69	9.00	1172.
21.	.01392	.8044	.8561	-256.8	-235.9	8.010	5.80	9.51	1148.
22.	.01414	.7407	.8365	-247.4	-226.2	8.465	5.90	10.06	1123.
23.	.01437	.6765	.8147	-237.4	-215.8	8.925	5.99	10.65	1097.
24.	.01464	.6103	.7902	-226.8	-204.8	9.393	6.06	11.32	1068.
25.	.01493	.5466	.7624	-215.5	-193.1	9.870	6.12	12.05	1037.
26.	.01526	.4806	.7310	-203.6	-180.7	10.358	6.17	12.91	1003.
27.	.01564	.4190	.6953	-190.8	-167.3	10.862	6.22	13.84	966.
28.	.01608	.3544	.6555	-177.0	-152.9	11.386	6.26	15.04	923.
29.	.01661	.2909	.6113	-162.1	-137.2	11.939	6.32	16.59	874.
30.	.01726	.2295	.5622	-145.5	-119.6	12.535	6.38	18.68	820.
31.	.01810	.1686	.5067	-126.6	-99.4	13.196	6.45	21.92	757.
32.	.01930	.1106	.4417	-103.9	-75.0	13.971	6.57	27.61	682.
33.	.02140	.0534	.3575	-73.3	-41.2	15.009	6.80	42.98	581.
34.	.03016	.0078	.2048	-1.9	43.4	17.524	8.76	174.96	395.
36.	.05798	.0408	.0942	104.8	191.8	21.806	7.27	33.56	434.
38.	.07082	.0656	.0737	138.9	245.1	23.250	6.84	22.59	465.
40.	.08105	.0857	.0620	163.8	285.4	24.284	6.67	18.44	487.
42.	.09006	.1030	.0546	185.0	320.1	25.131	6.58	16.45	508.
44.	.09836	.1186	.0492	204.1	351.7	25.866	6.53	15.23	526.
46.	.10618	.1331	.0450	222.0	381.2	26.524	6.50	14.40	543.
48.	.11365	.1467	.0416	238.9	409.4	27.123	6.49	13.81	559.
50.	.12085	.1597	.0388	255.3	436.6	27.678	6.49	13.37	573.
52.	.12785	.1721	.0363	271.2	463.0	28.195	6.51	13.03	587.
56.	.14135	.1956	.0324	302.1	514.1	29.143	6.55	12.56	612.
60.	.15439	.2178	.0294	332.2	563.8	30.000	6.64	12.29	635.
65.	.17022	.2443	.0263	369.5	624.8	30.977	6.80	12.15	661.
70.	.18567	.2698	.0239	407.0	685.5	31.877	7.03	12.16	683.
75.	.20084	.2945	.0220	445.3	746.6	32.720	7.32	12.28	703.
80.	.21580	.3186	.0203	484.8	808.5	33.519	7.66	12.50	721.
90.	.24526	.3655	.0177	568.6	936.5	35.025	8.45	13.12	753.
100.	.27427	.4112	.0158	659.9	1071.3	36.445	9.31	13.85	782.
110.	.30295	.4559	.0142	759.3	1213.7	37.799	10.14	14.60	810.
120.	.33142	.4999	.0129	865.9	1363.1	39.099	10.86	15.26	838.
130.	.35973	.5435	.0119	978.8	1518.4	40.342	11.43	15.78	866.
140.	.38790	.5868	.0110	1096.4	1678.2	41.526	11.84	16.16	895.
160.	.44397	.6724	.0095	1339.7	2005.7	43.712	12.23	16.50	952.
180.	.49977	.7572	.0084	1585.8	2335.5	45.655	12.20	16.44	1010.
200.	.55538	.8415	.0076	1828.7	2661.7	47.373	11.96	16.17	1067.
220.	.61087	.9255	.0069	2065.5	2981.8	48.898	11.64	15.84	1122.
240.	.66627	1.0091	.0063	2295.9	3295.3	50.262	11.34	15.52	1175.
260.	.72159	1.0926	.0058	2520.5	3602.9	51.494	11.08	15.25	1226.
280.	.77685	1.1759	.0054	2740.5	3905.8	52.616	10.88	15.04	1275.
300.	.83206	1.2591	.0050	2957.1	4205.2	53.650	10.73	14.88	1322.
350.	.96994	1.4665	.0043	3488.1	4943.0	55.923	10.51	14.66	1430.
400.	1.10769	1.6735	.0038	4011.8	5673.3	57.875	10.43	14.57	1529.
450.	1.24536	1.8803	.0033	4532.5	6400.5	59.589	10.41	14.54	1621.
500.	1.38297	2.0869	.0030	5053.2	7127.7	61.120	10.40	14.53	1708.
550.	1.52056	2.2934	.0027	5573.5	7854.3	62.505	10.41	14.54	1790.
600.	1.65812	2.4999	.0025	6094.6	8581.8	63.770	10.43	14.56	1868.
700.	1.93319	2.9127	.0021	7139.9	10039.7	66.018	10.48	14.61	2015.
800.	2.20822	3.3253	.0019	8192.6	11504.9	67.974	10.57	14.70	2150.
900.	2.48322	3.7379	.0017	9256.1	12980.9	69.710	10.70	14.83	2276.
1000.	2.75821	4.1505	.0015	10333.4	14470.7	71.283	10.86	14.98	2393.
1200.	3.30816	4.9755	.0013	12543.8	17506.0	74.036	11.24	15.37	2608.
1400.	3.85809	5.8004	.0011	14836.5	20623.6	76.443	11.68	15.80	2802.
1600.	4.40804	6.6253	.0009	17215.9	23827.9	78.560	12.11	16.23	2980.
1800.	4.95814	7.4502	.0008	19686.0	27123.3	80.462	12.54	16.67	3147.
2000.	5.50898	8.2751	.0008	22263.3	30526.8	82.321	13.11	17.26	3301.
2200.	6.06215	9.0999	.0007	24982.6	34075.8	84.684	14.00	18.20	3440.
2400.	6.62127	9.9248	.0006	27941.8	37873.7	87.382	15.48	19.81	3563.
2600.	7.19322	10.7497	.0006	31301.9	42091.7	90.372	17.90	22.48	3673.
2800.	7.78937	11.5745	.0005	35302.4	46986.5	93.581	21.62	26.57	3777.
3000.	8.42675	12.3993	.0005	40263.2	52903.4	96.920	26.94	32.79	3881.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

1.50 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)/V_P$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.296	77.8506	671.3	.25391	98.6543	.00951	78.66	264.09	.00057	1.25451	2.1424
15.	77.3176	673.7	.24889	94.5343	.00995	84.72	241.40	.00059	1.25264	1.9091
16.	76.5207	661.5	.24110	85.9509	.01089	91.13	214.88	.00060	1.24983	1.6983
17.	75.6762	664.0	.23165	80.1912	.01147	95.47	193.41	.00060	1.24687	1.5429
18.	74.7864	662.0	.22371	74.3219	.01218	98.64	175.72	.00059	1.24375	1.4359
19.	73.8480	657.9	.21687	68.6960	.01295	100.60	160.87	.00058	1.24046	1.3627
20.	72.8612	651.2	.21090	63.2062	.01382	102.39	148.24	.00056	1.23701	1.3034
21.	71.8281	641.8	.20547	57.7812	.01482	104.46	137.37	.00055	1.23341	1.2505
22.	70.7307	629.8	.20040	52.3925	.01597	105.78	127.79	.00054	1.22959	1.2148
23.	69.5672	615.2	.19561	47.0594	.01731	106.44	119.26	.00052	1.22555	1.1933
24.	68.3128	597.3	.19089	41.6902	.01895	106.48	111.48	.00050	1.22120	1.1853
25.	66.9679	578.4	.18604	36.6072	.02083	105.98	104.35	.00047	1.21655	1.1861
26.	65.5158	555.8	.18085	31.4849	.02322	104.91	97.72	.00045	1.21154	1.2021
27.	63.9263	533.2	.17498	26.7877	.02596	103.32	91.43	.00042	1.20608	1.2247
28.	62.1792	505.8	.16830	22.0382	.02974	101.22	85.42	.00039	1.20009	1.2696
29.	60.2136	475.4	.16072	17.5136	.03491	98.55	79.52	.00036	1.19338	1.3391
30.	57.9478	441.9	.15217	13.2993	.04227	95.19	73.59	.00032	1.18567	1.4441
31.	55.2427	403.0	.14212	9.3138	.05440	90.61	67.45	.00027	1.17651	1.6322
32.	51.8031	358.1	.12978	5.7282	.07711	86.46	60.78	.00022	1.16493	1.9411
33.	46.7257	300.0	.11254	2.4954	.14328	85.30	52.63	.00015	1.14799	2.6518
34.	33.1607	221.1	.07050	.2588	.79145	120.16	37.31	.00007	1.10354	5.4322
36.	17.2459	251.0	.07512	.7044	.13372	48.97	25.44	.00030	1.05294	1.7437
38.	14.1209	284.3	.07621	.9270	.07946	43.71	24.50	.00049	1.04320	1.2664
40.	12.3383	314.6	.07535	1.0570	.05862	42.27	24.54	.00067	1.03768	1.0705
42.	11.1031	344.3	.07481	1.1436	.04777	42.09	24.90	.00083	1.03386	.9730
44.	10.1664	373.1	.07416	1.2062	.04081	42.41	25.40	.00099	1.03097	.9120
46.	9.4180	401.1	.07349	1.2538	.03591	43.01	25.98	.00114	1.02867	.8699
48.	8.7991	428.5	.07281	1.2912	.03223	43.79	26.60	.00130	1.02677	.8389
50.	8.2746	455.6	.07213	1.3213	.02934	44.69	27.25	.00145	1.02516	.8152
52.	7.8219	482.5	.07143	1.3460	.02700	45.66	27.91	.00161	1.02377	.7965
56.	7.0744	536.3	.06991	1.3836	.02342	47.78	29.25	.00194	1.02148	.7691
60.	6.4771	590.9	.06830	1.4109	.02081	50.12	30.60	.00227	1.01965	.7504
65.	5.8748	662.0	.06595	1.4355	.01835	53.51	32.26	.00270	1.01781	.7325
70.	5.3859	737.8	.06326	1.4533	.01648	56.99	33.91	.00313	1.01632	.7234
75.	4.9790	819.3	.06035	1.4665	.01499	60.28	35.52	.00355	1.01508	.7239
80.	4.6339	907.1	.05733	1.4766	.01378	63.95	37.11	.00397	1.01403	.7254
90.	4.0774	1101.5	.05150	1.4905	.01191	73.56	40.19	.00495	1.01234	.7165
100.	3.6461	1317.4	.04646	1.4992	.01052	83.22	43.16	.00593	1.01103	.7184
110.	3.3008	1548.3	.04239	1.5047	.00943	93.78	45.14	.00701	1.00998	.7029
120.	3.0173	1782.0	.03942	1.5085	.00856	104.22	47.92	.00815	1.00912	.7016
130.	2.7799	2010.9	.03732	1.5110	.00785	114.10	50.62	.00936	1.00840	.7002
140.	2.5780	2229.3	.03591	1.5126	.00725	122.91	53.26	.01062	1.00779	.7003
160.	2.2524	2619.8	.03462	1.5145	.00630	137.27	58.35	.01330	1.00680	.7013
180.	2.0009	2949.5	.03458	1.5151	.00557	148.28	63.24	.01623	1.00604	.7009
200.	1.8006	3233.3	.03519	1.5152	.00500	157.26	67.95	.01945	1.00544	.6986
220.	1.6370	3490.3	.03606	1.5150	.00454	165.15	72.51	.02293	1.00494	.6953
240.	1.5009	3736.1	.03696	1.5146	.00415	172.54	76.94	.02667	1.00453	.6921
260.	1.3858	3981.5	.03776	1.5141	.00383	179.75	81.25	.03061	1.00418	.6895
280.	1.2872	4231.2	.03842	1.5136	.00356	186.96	85.46	.03476	1.00388	.6876
300.	1.2018	4487.9	.03892	1.5132	.00332	194.23	89.57	.03909	1.00363	.6863
350.	1.0310	5158.8	.03963	1.5119	.00284	212.78	99.47	.05069	1.00311	.6853
400.	.9028	5859.2	.03989	1.5108	.00249	231.63	108.92	.06340	1.00272	.6850
450.	.8030	6579.2	.03993	1.5098	.00221	250.44	118.00	.07721	1.00242	.6852
500.	.7231	7304.2	.03992	1.5090	.00199	269.01	126.75	.09215	1.00218	.6848
550.	.6577	8036.0	.03986	1.5083	.00181	287.25	135.22	.10813	1.00198	.6845
600.	.6031	8773.0	.03978	1.5077	.00166	305.16	143.44	.12515	1.00182	.6842
700.	.5173	10268.3	.03954	1.5067	.00142	340.28	159.26	.15210	1.00156	.6837
800.	.4529	11802.8	.03917	1.5059	.00125	374.95	174.37	.20278	1.00137	.6836
900.	.4027	13387.6	.03869	1.5053	.00111	409.69	188.91	.24703	1.00121	.6836
1000.	.3626	15030.0	.03811	1.5048	.00100	444.77	202.97	.29473	1.00109	.6838
1200.	.3023	18489.4	.03678	1.5040	.00083	511.13	229.88	.39610	1.00091	.6912
1400.	.2592	22176.3	.03539	1.5034	.00071	583.40	255.51	.51269	1.00078	.6922
1600.	.2269	26022.7	.03414	1.5030	.00062	656.20	280.06	.64152	1.00068	.6928
1800.	.2017	30062.1	.03294	1.5026	.00055	731.95	303.68	.78362	1.00061	.6917
2000.	.1815	34565.6	.03152	1.5021	.00050	820.96	326.45	.94338	1.00055	.6863
2200.	.1650	40066.6	.02953	1.5011	.00045	943.71	344.95	1.13168	1.00050	.6652
2400.	.1510	47502.8	.02673	1.4989	.00042	1135.53	366.43	1.36654	1.00046	.6392
2600.	.1390	58236.3	.02318	1.4944	.00039	1447.37	387.70	1.66710	1.00042	.6022
2800.	.1284	73966.0	.01930	1.4859	.00036	1942.60	409.09	2.04278	1.00039	.5616
3000.	.1187	96506.1	.01564	1.4714	.00034	2689.20	431.05	2.48770	1.00036	.5256

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

2.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.457	.01280	1.2994	.9407	-308.1	-282.5	5.013	4.77	6.38	1319.
15.	.01287	1.2650	.9449	-304.7	-278.9	5.254	4.88	6.63	1311.
16.	.01300	1.1850	.9435	-298.1	-272.1	5.696	5.06	7.09	1288.
17.	.01313	1.1096	.9322	-291.0	-264.8	6.138	5.23	7.53	1264.
18.	.01328	1.0414	.9177	-283.6	-257.0	6.581	5.39	7.96	1240.
19.	.01345	.9770	.9029	-275.7	-248.8	7.024	5.54	8.41	1218.
20.	.01362	.9157	.8873	-267.4	-240.2	7.467	5.67	8.86	1196.
21.	.01381	.8527	.8704	-258.7	-231.1	7.910	5.79	9.34	1173.
22.	.01401	.7908	.8514	-249.5	-221.5	8.356	5.89	9.85	1150.
23.	.01423	.7273	.8307	-239.9	-211.4	8.805	5.97	10.39	1125.
24.	.01447	.6647	.8075	-229.7	-200.7	9.260	6.05	10.98	1098.
25.	.01474	.6021	.7817	-218.9	-189.4	9.721	6.11	11.63	1070.
26.	.01504	.5392	.7529	-207.5	-177.5	10.191	6.16	12.35	1039.
27.	.01537	.4780	.7209	-195.5	-164.7	10.672	6.21	13.15	1006.
28.	.01575	.4174	.6856	-182.6	-151.1	11.166	6.26	14.08	969.
29.	.01619	.3585	.6467	-168.9	-136.5	11.678	6.30	15.17	929.
30.	.01671	.2994	.6046	-154.1	-120.7	12.216	6.34	16.57	884.
31.	.01733	.2429	.5588	-137.9	-103.2	12.787	6.40	18.37	835.
32.	.01812	.1881	.5085	-119.9	-83.7	13.408	6.46	20.89	780.
33.	.01915	.1373	.4528	-99.4	-61.1	14.102	6.54	24.60	719.
34.	.02062	.0915	.3897	-75.0	-33.8	14.918	6.67	30.65	649.
36.	.02752	.0300	.2395	-2.1	53.0	17.389	7.30	59.51	494.
38.	.04137	.0388	.1415	77.1	159.8	20.286	7.23	40.85	468.
40.	.05206	.0618	.1061	120.7	224.8	21.956	6.92	26.66	488.
42.	.06054	.0824	.0877	150.8	271.9	23.105	6.73	21.10	508.
44.	.06776	.1002	.0762	175.1	310.6	24.005	6.62	18.34	527.
46.	.07446	.1169	.0680	196.5	345.4	24.780	6.58	16.66	544.
48.	.08071	.1323	.0617	216.2	377.6	25.465	6.57	15.56	560.
50.	.08664	.1468	.0567	234.6	407.9	26.083	6.56	14.77	575.
52.	.09232	.1606	.0526	252.2	436.8	26.651	6.57	14.20	589.
56.	.10314	.1863	.0461	285.7	492.0	27.674	6.61	13.41	615.
60.	.11345	.2102	.0413	317.7	544.6	28.581	6.68	12.94	638.
65.	.12584	.2385	.0367	356.8	608.5	29.604	6.84	12.64	664.
70.	.13784	.2654	.0331	395.7	671.4	30.536	7.06	12.55	687.
75.	.14956	.2913	.0302	435.1	734.2	31.403	7.34	12.60	707.
80.	.16106	.3164	.0278	475.5	797.6	32.221	7.68	12.77	725.
90.	.18360	.3650	.0241	560.6	927.8	33.754	8.47	13.31	757.
100.	.20571	.4119	.0214	652.9	1064.3	35.192	9.32	14.00	787.
110.	.22749	.4575	.0192	753.2	1208.1	36.560	10.15	14.72	814.
120.	.24906	.5024	.0174	860.5	1358.6	37.869	10.87	15.36	842.
130.	.27047	.5467	.0159	973.9	1514.8	39.119	11.44	15.86	871.
140.	.29176	.5905	.0147	1091.9	1675.4	40.309	11.85	16.23	899.
160.	.33405	.6770	.0128	1335.9	2004.0	42.503	12.24	16.55	957.
180.	.37609	.7625	.0113	1582.6	2334.8	44.451	12.21	16.48	1014.
200.	.41794	.8474	.0101	1825.8	2661.7	46.172	11.97	16.20	1071.
220.	.45968	.9317	.0092	2063.0	2982.4	47.701	11.65	15.86	1126.
240.	.50131	1.0157	.0084	2293.7	3296.3	49.067	11.34	15.54	1180.
260.	.54288	1.0995	.0077	2518.6	3604.3	50.300	11.09	15.27	1231.
280.	.58439	1.1830	.0072	2738.7	3907.5	51.424	10.88	15.06	1279.
300.	.62587	1.2665	.0067	2955.6	4207.4	52.458	10.73	14.90	1326.
350.	.72937	1.4743	.0057	3486.9	4945.6	54.733	10.52	14.67	1434.
400.	.83275	1.6815	.0050	4010.8	5676.3	56.686	10.43	14.57	1533.
450.	.93605	1.8885	.0045	4531.7	6403.8	58.401	10.41	14.55	1624.
500.	1.03929	2.0952	.0040	5052.6	7131.2	59.932	10.40	14.54	1711.
550.	1.14251	2.3019	.0036	5572.9	7857.9	61.318	10.41	14.54	1793.
600.	1.24570	2.5084	.0033	6094.2	8585.6	62.583	10.43	14.56	1871.
700.	1.45203	2.9213	.0029	7139.5	10043.6	64.831	10.48	14.61	2018.
800.	1.65832	3.3340	.0025	8192.3	11509.0	66.787	10.57	14.70	2153.
900.	1.86459	3.7466	.0022	9255.8	12985.0	68.524	10.70	14.83	2278.
1000.	2.07084	4.1592	.0020	10333.2	14474.9	70.096	10.86	14.98	2396.
1200.	2.48332	4.9843	.0017	12543.6	17510.3	72.850	11.24	15.37	2610.
1400.	2.89578	5.8092	.0014	14836.4	20627.9	75.257	11.68	15.80	2804.
1600.	3.30824	6.6342	.0013	17215.6	23832.1	77.373	12.10	16.23	2982.
1800.	3.72080	7.4591	.0011	19684.6	27126.2	79.275	12.53	16.66	3149.
2000.	4.13384	8.2840	.0010	22257.2	30524.9	81.131	13.07	17.22	3303.
2200.	4.54839	9.1088	.0009	24961.4	34058.1	83.487	13.88	18.07	3444.
2400.	4.96682	9.9337	.0008	27881.8	37815.5	86.167	15.21	19.51	3569.
2600.	5.39357	10.7585	.0008	31157.5	41944.6	89.122	17.35	21.86	3682.
2800.	5.83606	11.5834	.0007	34995.0	46667.1	92.267	20.60	25.52	3786.
3000.	6.30535	12.4082	.0007	39671.0	52281.7	95.502	25.26	30.87	3890.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

2.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)/V_P$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.457	78.1196	688.5	.25262	101.5121	.00927	80.58	267.20	.00058	1.25546	2.1155
15.	77.7130	689.7	.24935	98.3063	.00961	85.23	249.22	.00060	1.25403	1.9386
16.	76.9464	685.5	.24215	91.1801	.01035	91.81	221.79	.00061	1.25133	1.7135
17.	76.1334	682.5	.23391	84.4778	.01104	96.32	199.58	.00060	1.24847	1.5606
18.	75.2732	680.3	.22598	78.3875	.01171	99.64	181.27	.00060	1.24545	1.4489
19.	74.3695	676.5	.21912	72.6572	.01243	101.74	165.95	.00059	1.24229	1.3714
20.	73.4224	671.4	.21311	67.2294	.01320	103.67	152.96	.00057	1.23897	1.3073
21.	72.4296	662.9	.20771	61.7632	.01409	105.90	141.77	.00056	1.23551	1.2507
22.	71.3823	652.7	.20261	56.4471	.01508	107.38	131.98	.00055	1.23186	1.2100
23.	70.2758	639.5	.19784	51.1094	.01625	108.22	123.28	.00053	1.22801	1.1840
24.	69.0976	624.6	.19317	45.9266	.01758	108.47	115.43	.00051	1.22392	1.1686
25.	67.8399	607.4	.18853	40.8460	.01914	108.19	108.27	.00049	1.21956	1.1634
26.	66.4945	588.0	.18367	35.8550	.02100	107.37	101.65	.00047	1.21492	1.1689
27.	65.0436	567.2	.17842	31.0906	.02319	106.09	95.46	.00045	1.20992	1.1832
28.	63.4743	544.2	.17267	26.4928	.02588	104.38	89.61	.00042	1.20453	1.2090
29.	61.7543	519.4	.16625	22.1398	.02921	102.20	83.98	.00039	1.19864	1.2466
30.	59.8446	491.1	.15926	17.9155	.03375	99.54	78.48	.00036	1.19212	1.3066
31.	57.6930	460.7	.15142	14.0151	.03987	95.97	73.03	.00033	1.18480	1.3977
32.	55.2006	426.7	.14257	10.3835	.04897	91.79	67.50	.00029	1.17637	1.5366
33.	52.2285	389.7	.13249	7.1714	.06313	87.82	61.76	.00025	1.16636	1.7303
34.	48.4961	349.2	.12049	4.4390	.08778	84.92	55.59	.00021	1.15388	2.0066
36.	36.3370	270.5	.09025	1.0885	.22002	80.21	40.96	.00013	1.11384	3.0388
38.	24.1693	270.4	.08095	.9366	.15110	60.34	31.40	.00022	1.07475	2.1255
40.	19.2072	298.3	.07980	1.1871	.08935	51.56	28.51	.00036	1.05909	1.4742
42.	16.5171	327.5	.07896	1.3614	.06444	48.56	27.62	.00050	1.05066	1.2302
44.	14.7578	355.7	.07799	1.4784	.05155	47.51	27.48	.00063	1.04518	1.0604
46.	13.4303	384.8	.07688	1.5698	.04329	47.26	27.66	.00076	1.04106	.9748
48.	12.3903	413.5	.07582	1.6397	.03762	47.48	28.01	.00089	1.03784	.9179
50.	11.5426	441.8	.07482	1.6949	.03344	47.96	28.47	.00101	1.03522	.8771
52.	10.8320	469.7	.07386	1.7393	.03022	48.62	29.00	.00114	1.03302	.8466
56.	9.6956	525.2	.07193	1.8060	.02553	50.30	30.15	.00139	1.02952	.8037
60.	8.8146	581.0	.07008	1.8533	.02228	52.34	31.37	.00165	1.02681	.7758
65.	7.9467	653.4	.06750	1.8955	.01935	55.46	32.93	.00199	1.02415	.7596
70.	7.2548	730.1	.06462	1.9256	.01719	58.75	34.50	.00232	1.02203	.7369
75.	6.6864	812.3	.06155	1.9479	.01551	61.79	36.06	.00264	1.02029	.7354
80.	6.2088	900.7	.05839	1.9647	.01417	65.35	37.60	.00297	1.01883	.7344
90.	5.4465	1096.1	.05234	1.9877	.01214	74.84	40.61	.00372	1.01651	.7223
100.	4.8612	1312.9	.04714	2.0021	.01066	84.39	43.53	.00446	1.01472	.7223
110.	4.3958	1545.5	.04292	2.0111	.00953	94.50	45.37	.00526	1.01331	.7067
120.	4.0150	1780.4	.03986	2.0171	.00863	104.85	48.11	.00612	1.01215	.7045
130.	3.6972	2010.7	.03770	2.0211	.00789	114.65	50.78	.00704	1.01118	.7027
140.	3.4275	2230.4	.03625	2.0238	.00728	123.39	53.40	.00799	1.01037	.7023
160.	2.9935	2623.4	.03489	2.0266	.00631	137.64	58.46	.01000	1.00905	.7029
180.	2.6590	2955.2	.03482	2.0275	.00558	148.58	63.33	.01221	1.00803	.7022
200.	2.3927	3240.7	.03540	2.0275	.00500	157.51	68.02	.01463	1.00723	.6997
220.	2.1754	3498.9	.03626	2.0270	.00453	165.36	72.57	.01725	1.00657	.6962
240.	1.9948	3745.8	.03715	2.0262	.00415	172.72	77.00	.02006	1.00602	.6928
260.	1.8420	3991.9	.03793	2.0253	.00383	179.91	81.30	.02302	1.00556	.6901
280.	1.7112	4242.3	.03858	2.0243	.00355	187.10	85.50	.02614	1.00517	.6881
300.	1.5978	4499.8	.03907	2.0236	.00331	194.36	89.61	.02940	1.00482	.6867
350.	1.3710	5171.6	.03976	2.0213	.00284	212.88	99.50	.03811	1.00414	.6856
400.	1.2008	5872.5	.04000	2.0192	.00248	231.71	108.95	.04766	1.00362	.6853
450.	1.0683	6593.0	.04003	2.0175	.00221	250.51	118.02	.05803	1.00322	.6854
500.	.9622	7318.3	.04001	2.0160	.00199	269.07	126.77	.06925	1.00290	.6849
550.	.8753	8050.4	.03994	2.0147	.00181	287.30	135.23	.08125	1.00264	.6846
600.	.8028	8787.6	.03985	2.0136	.00166	305.21	143.46	.09402	1.00242	.6842
700.	.6887	10283.2	.03960	2.0119	.00142	340.32	159.27	.12176	1.00208	.6838
800.	.6030	11818.0	.03922	2.0105	.00124	374.99	174.38	.15229	1.00182	.6836
900.	.5363	13403.1	.03873	2.0094	.00111	409.72	188.92	.18550	1.00162	.6836
1000.	.4829	15045.8	.03815	2.0085	.00100	444.80	202.97	.22129	1.00146	.6838
1200.	.4027	18505.6	.03682	2.0071	.00083	511.13	229.89	.29733	1.00121	.6912
1400.	.3453	22192.8	.03542	2.0061	.00071	583.38	255.51	.38480	1.00104	.6922
1600.	.3023	26036.4	.03416	2.0053	.00062	656.06	280.06	.48142	1.00091	.6928
1800.	.2688	30059.0	.03299	2.0047	.00055	731.13	303.68	.58781	1.00081	.6920
2000.	.2419	34497.9	.03163	2.0039	.00050	817.64	326.45	.70681	1.00073	.6873
2200.	.2199	39813.8	.02979	2.0026	.00045	933.31	344.94	.84556	1.00066	.6680
2400.	.2013	46818.6	.02721	2.0000	.00042	1108.78	366.40	1.01629	1.00061	.6446
2600.	.1854	56694.2	.02392	1.9947	.00039	1388.28	387.60	1.23292	1.00056	.6104
2800.	.1713	70922.8	.02023	1.9848	.00036	1827.16	408.85	1.50402	1.00052	.5711
3000.	.1586	91109.1	.01664	1.9679	.00034	2485.57	430.56	1.82796	1.00048	.5347

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

2.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.615	.01276	1.3311	.9438	-307.8	-275.9	5.024	4.79	6.38	1332.
15.	.01280	1.3125	.9471	-305.4	-273.4	5.193	4.87	6.55	1329.
16.	.01293	1.2382	.9495	-299.0	-266.6	5.630	5.05	7.00	1310.
17.	.01306	1.1575	.9442	-292.1	-259.4	6.068	5.23	7.46	1285.
18.	.01320	1.0930	.9296	-284.8	-251.8	6.505	5.38	7.86	1264.
19.	.01336	1.0271	.9152	-277.1	-243.7	6.942	5.53	8.29	1241.
20.	.01352	.9641	.8999	-269.0	-235.2	7.379	5.66	8.73	1220.
21.	.01370	.9029	.8836	-260.5	-226.2	7.816	5.77	9.18	1198.
22.	.01389	.8411	.8655	-251.5	-216.8	8.254	5.87	9.65	1176.
23.	.01410	.7795	.8456	-242.1	-206.9	8.694	5.96	10.16	1152.
24.	.01432	.7170	.8236	-232.3	-196.5	9.138	6.04	10.70	1127.
25.	.01457	.6554	.7993	-221.9	-185.5	9.586	6.11	11.28	1100.
26.	.01484	.5935	.7725	-211.0	-173.9	10.041	6.16	11.92	1072.
27.	.01514	.5348	.7431	-199.5	-161.6	10.503	6.21	12.60	1042.
28.	.01548	.4768	.7109	-187.4	-148.6	10.976	6.25	13.37	1009.
29.	.01586	.4193	.6761	-174.5	-134.8	11.460	6.29	14.25	974.
30.	.01630	.3619	.6386	-160.8	-120.1	11.960	6.33	15.31	935.
31.	.01680	.3088	.5984	-146.2	-104.2	12.483	6.37	16.52	895.
32.	.01740	.2566	.5555	-130.4	-86.9	13.029	6.42	18.07	850.
33.	.01813	.2071	.5095	-113.2	-67.9	13.614	6.47	20.07	802.
34.	.01904	.1628	.4605	-94.2	-46.6	14.249	6.53	22.59	750.
36.	.02184	.0888	.3529	-48.6	6.0	15.751	6.73	30.80	638.
38.	.02724	.0509	.2453	10.1	78.2	17.701	7.05	40.39	540.
40.	.03530	.0523	.1728	68.0	156.2	19.705	7.06	35.52	513.
42.	.04305	.0690	.1338	110.7	218.3	21.221	6.91	27.10	520.
44.	.04977	.0872	.1111	142.7	267.2	22.358	6.77	22.20	534.
46.	.05576	.1048	.0962	169.0	308.4	23.276	6.69	19.31	550.
48.	.06125	.1213	.0855	192.0	345.1	24.057	6.64	17.49	565.
50.	.06631	.1365	.0774	212.8	378.6	24.739	6.63	16.28	579.
52.	.07120	.1512	.0713	232.3	410.3	25.363	6.63	15.49	594.
56.	.08040	.1787	.0614	268.9	469.9	26.467	6.67	14.31	619.
60.	.08905	.2042	.0544	303.0	525.7	27.429	6.73	13.62	643.
65.	.09936	.2339	.0478	344.0	592.4	28.498	6.87	13.15	669.
70.	.10928	.2621	.0428	384.4	657.6	29.464	7.09	12.94	692.
75.	.11891	.2890	.0389	424.9	722.2	30.355	7.37	12.92	712.
80.	.12832	.3151	.0357	466.2	787.0	31.192	7.70	13.03	730.
90.	.14670	.3650	.0308	552.7	919.4	32.751	8.48	13.50	762.
100.	.16465	.4131	.0271	646.0	1057.6	34.206	9.33	14.15	792.
110.	.18228	.4596	.0242	747.1	1202.8	35.588	10.17	14.84	819.
120.	.19970	.5052	.0220	855.1	1354.3	36.906	10.88	15.45	847.
130.	.21697	.5501	.0201	969.0	1511.4	38.163	11.45	15.94	875.
140.	.23411	.5944	.0185	1087.5	1672.7	39.358	11.86	16.30	904.
160.	.26813	.6818	.0161	1332.2	2002.5	41.560	12.25	16.50	961.
180.	.30190	.7680	.0142	1579.4	2334.1	43.513	12.22	16.51	1019.
200.	.33550	.8533	.0127	1823.1	2661.8	45.239	11.97	16.23	1076.
220.	.36897	.9381	.0115	2060.6	2983.0	46.770	11.65	15.89	1131.
240.	.40235	1.0225	.0105	2291.5	3297.4	48.138	11.35	15.56	1184.
260.	.43566	1.1065	.0097	2516.6	3605.8	49.372	11.09	15.29	1235.
280.	.46892	1.1902	.0090	2737.0	3909.3	50.497	10.89	15.07	1284.
300.	.50216	1.2740	.0084	2954.2	4209.6	51.533	10.74	14.91	1330.
350.	.58503	1.4821	.0072	3485.8	4948.3	53.810	10.52	14.68	1438.
400.	.66779	1.6896	.0063	4009.9	5679.4	55.764	10.43	14.58	1537.
450.	.75045	1.8967	.0056	4531.0	6407.1	57.479	10.41	14.55	1628.
500.	.83309	2.1036	.0050	5052.0	7134.7	59.011	10.40	14.54	1715.
550.	.91568	2.3103	.0046	5572.4	7861.6	60.397	10.41	14.55	1796.
600.	.99825	2.5169	.0042	6093.7	8589.3	61.662	10.43	14.56	1875.
700.	1.16334	2.9299	.0036	7139.2	10047.5	63.911	10.48	14.61	2021.
800.	1.32839	3.3427	.0031	8192.0	11513.0	65.866	10.57	14.70	2156.
900.	1.49341	3.7553	.0028	9255.6	12989.2	67.603	10.70	14.83	2281.
1000.	1.65842	4.1680	.0025	10333.0	14479.1	69.176	10.86	14.99	2398.
1200.	1.98841	4.9931	.0021	12543.5	17514.5	71.929	11.24	15.37	2612.
1400.	2.31838	5.8180	.0018	14836.3	20632.2	74.336	11.68	15.80	2806.
1600.	2.64836	6.6430	.0016	17215.4	23836.3	76.453	12.10	16.23	2984.
1800.	2.97840	7.4679	.0014	19683.7	27129.7	78.354	12.52	16.65	3151.
2000.	3.30878	8.2928	.0013	22253.0	30524.9	80.209	13.04	17.19	3306.
2200.	3.64025	9.1177	.0011	24946.8	34047.5	82.559	13.80	17.99	3447.
2400.	3.97448	9.9425	.0010	27840.9	37777.1	85.227	15.02	19.30	3574.
2600.	4.31469	10.7674	.0010	31058.9	41845.6	88.158	16.97	21.44	3688.
2800.	4.66616	11.5922	.0009	34785.1	46450.5	91.259	19.91	24.74	3794.
3000.	5.03682	12.4171	.0008	39266.7	51858.8	94.424	24.11	29.55	3898.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

2.50 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.615	78.3836	705.3	.25148	104.3378	.00905	82.46	270.30	.00059	1.25639	2.0913
15.	78.1041	708.6	.24920	102.5141	.00924	85.73	257.35	.00060	1.25541	1.9652
16.	77.3614	706.3	.24281	95.7904	.00991	92.48	228.86	.00061	1.25279	1.7326
17.	76.5720	700.2	.23596	88.6329	.01065	97.14	205.81	.00061	1.25001	1.5803
18.	75.7402	700.3	.22800	82.7863	.01123	100.60	186.86	.00061	1.24709	1.4608
19.	74.8684	696.8	.22111	76.9010	.01190	102.83	171.05	.00060	1.24403	1.3793
20.	73.9536	691.6	.21508	71.2964	.01262	104.90	157.65	.00058	1.24083	1.3118
21.	72.9991	684.8	.20968	65.9100	.01341	107.28	146.15	.00058	1.23750	1.2507
22.	71.9949	675.5	.20462	60.5553	.01429	108.91	136.11	.00056	1.23399	1.2066
23.	70.9403	664.1	.19987	55.2969	.01529	109.91	127.25	.00055	1.23032	1.1758
24.	69.8221	650.3	.19526	50.0652	.01645	110.33	119.28	.00053	1.22643	1.1565
25.	68.6371	634.8	.19073	44.9868	.01777	110.24	112.05	.00051	1.22232	1.1464
26.	67.3769	617.1	.18610	39.9903	.01932	109.64	105.41	.00049	1.21796	1.1460
27.	66.0317	599.0	.18121	35.3141	.02104	108.61	99.24	.00047	1.21332	1.1516
28.	64.5913	579.1	.17599	30.7942	.02309	107.17	93.46	.00045	1.20836	1.1658
29.	63.0401	557.1	.17040	26.4313	.02558	105.35	87.98	.00042	1.20304	1.1900
30.	61.3589	532.4	.16439	22.2056	.02876	103.15	82.72	.00040	1.19728	1.2278
31.	59.5118	507.4	.15779	18.3786	.03256	100.15	77.61	.00037	1.19098	1.2803
32.	57.4635	479.8	.15060	14.7479	.03767	96.76	72.58	.00034	1.18402	1.3555
33.	55.1553	449.9	.14279	11.4245	.04460	92.91	67.56	.00030	1.17621	1.4591
34.	52.5200	419.4	.13424	8.5493	.05386	89.17	62.51	.00027	1.16734	1.5836
36.	45.7965	355.0	.11450	4.0682	.08675	83.05	52.11	.00021	1.14490	1.9321
38.	36.7123	307.7	.09474	1.8688	.13127	75.30	42.00	.00018	1.11506	2.2526
40.	28.3274	304.5	.08639	1.4810	.11665	64.70	35.39	.00023	1.08800	1.9429
42.	23.2312	324.6	.08336	1.6025	.08349	57.52	32.25	.00033	1.07177	1.5196
44.	20.0928	350.1	.08161	1.7516	.06342	54.07	30.78	.00044	1.06187	1.2640
46.	17.9350	377.3	.08014	1.8787	.05118	52.45	30.17	.00055	1.05510	1.1107
48.	16.3274	405.2	.07877	1.9804	.04315	51.80	30.01	.00065	1.05007	1.0132
50.	15.0802	432.8	.07748	2.0578	.03762	51.72	30.14	.00076	1.04618	.9490
52.	14.0443	461.5	.07656	2.1241	.03356	51.98	30.42	.00086	1.04296	.9062
56.	12.4383	517.8	.07408	2.2229	.02764	53.07	31.25	.00107	1.03799	.8427
60.	11.2294	574.3	.07196	2.2926	.02372	54.72	32.28	.00129	1.03425	.8035
65.	10.0642	647.3	.06911	2.3545	.02031	57.53	33.69	.00157	1.03066	.7697
70.	9.1511	724.6	.06603	2.3985	.01786	60.58	35.15	.00184	1.02785	.7508
75.	8.4099	807.3	.06278	2.4308	.01600	63.37	36.63	.00210	1.02557	.7469
80.	7.7927	896.1	.05948	2.4551	.01454	66.80	38.12	.00237	1.02368	.7434
90.	6.8166	1092.3	.05320	2.4883	.01236	76.14	41.05	.00298	1.02069	.7279
100.	6.0735	1309.9	.04783	2.5089	.01080	85.57	43.91	.00359	1.01842	.7260
110.	5.4862	1543.9	.04344	2.5216	.00961	95.30	45.62	.00421	1.01663	.7104
120.	5.0075	1779.9	.04030	2.5300	.00868	105.54	48.32	.00491	1.01517	.7075
130.	4.6090	2011.4	.03808	2.5355	.00793	115.25	50.96	.00565	1.01396	.7051
140.	4.2715	2232.3	.03659	2.5391	.00730	123.92	53.55	.00641	1.01293	.7044
160.	3.7295	2627.6	.03517	2.5428	.00632	138.05	58.58	.00803	1.01128	.7044
180.	3.3124	2961.4	.03506	2.5438	.00558	148.90	63.42	.00980	1.01002	.7034
200.	2.9807	3248.5	.03562	2.5435	.00500	157.77	68.11	.01174	1.00901	.7007
220.	2.7103	3507.9	.03646	2.5425	.00453	165.58	72.65	.01384	1.00819	.6970
240.	2.4854	3755.7	.03733	2.5412	.00414	172.91	77.05	.01609	1.00751	.6935
260.	2.2954	4002.6	.03810	2.5397	.00382	180.07	81.36	.01847	1.00693	.6907
280.	2.1326	4253.6	.03874	2.5382	.00354	187.24	85.55	.02097	1.00644	.6887
300.	1.9914	4511.9	.03921	2.5371	.00330	194.49	89.65	.02358	1.00601	.6872
350.	1.7093	5184.5	.03988	2.5333	.00283	212.98	99.54	.03057	1.00516	.6859
400.	1.4975	5886.0	.04011	2.5301	.00248	231.80	108.98	.03822	1.00452	.6855
450.	1.3325	6606.8	.04013	2.5274	.00220	250.58	118.04	.04652	1.00402	.6855
500.	1.2004	7332.5	.04009	2.5250	.00198	269.13	126.79	.05551	1.00362	.6851
550.	1.0921	8064.8	.04002	2.5230	.00180	287.35	135.25	.06512	1.00329	.6847
600.	1.0018	8802.3	.03992	2.5213	.00165	305.26	143.47	.07535	1.00302	.6843
700.	.8596	10298.1	.03966	2.5185	.00142	340.36	159.28	.09755	1.00259	.6838
800.	.7528	11833.2	.03928	2.5163	.00124	375.02	174.39	.12199	1.00227	.6836
900.	.6696	13418.5	.03878	2.5146	.00110	409.74	188.93	.14857	1.00202	.6837
1000.	.6030	15061.5	.03819	2.5132	.00099	444.82	202.98	.17722	1.00182	.6838
1200.	.5029	18521.9	.03685	2.5111	.00083	511.13	229.90	.23807	1.00152	.6913
1400.	.4313	22209.3	.03545	2.5095	.00071	583.37	255.52	.30807	1.00130	.6922
1600.	.3776	26051.3	.03419	2.5082	.00062	655.96	280.07	.38537	1.00114	.6929
1800.	.3358	30062.4	.03303	2.5074	.00055	730.57	303.68	.47039	1.00101	.6922
2000.	.3022	34457.4	.03171	2.5063	.00050	815.37	326.45	.56514	1.00091	.6881
2200.	.2747	39647.2	.02997	2.5047	.00045	926.22	344.93	.67478	1.00083	.6699
2400.	.2516	46357.7	.02756	2.5016	.00042	1090.52	366.37	.80831	1.00076	.6485
2600.	.2318	55647.1	.02445	2.4955	.00039	1347.91	387.53	.97648	1.00070	.6164
2800.	.2143	68847.9	.02093	2.4843	.00036	1748.17	408.68	1.18681	1.00065	.5785
3000.	.1985	87415.3	.01741	2.4653	.00034	2345.90	430.21	1.43955	1.00060	.5419

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

3.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.772	.01272	1.3623	.9470	-307.5	-269.4	5.036	4.81	6.38	1345.
15.	.01274	1.3585	.9492	-306.1	-267.9	5.135	4.86	6.47	1345.
16.	.01286	1.2794	.9544	-299.8	-261.2	5.568	5.05	6.93	1326.
17.	.01299	1.2075	.9510	-293.0	-254.1	6.000	5.22	7.37	1306.
18.	.01313	1.1408	.9404	-285.9	-246.5	6.433	5.37	7.78	1285.
19.	.01327	1.0731	.9266	-278.3	-238.5	6.865	5.52	8.20	1262.
20.	.01343	1.0093	.9118	-270.4	-230.1	7.296	5.65	8.62	1241.
21.	.01360	.9488	.8960	-262.1	-221.3	7.726	5.76	9.05	1221.
22.	.01378	.8875	.8787	-253.3	-212.0	8.157	5.86	9.50	1199.
23.	.01397	.8271	.8595	-244.2	-202.3	8.590	5.95	9.97	1177.
24.	.01419	.7655	.8386	-234.6	-192.1	9.024	6.03	10.47	1153.
25.	.01442	.7053	.8155	-224.6	-181.4	9.462	6.10	11.00	1128.
26.	.01467	.6461	.7904	-214.1	-170.1	9.904	6.16	11.57	1102.
27.	.01494	.5884	.7629	-203.0	-158.2	10.352	6.21	12.17	1074.
28.	.01525	.5315	.7331	-191.4	-145.7	10.806	6.25	12.84	1044.
29.	.01559	.4762	.7011	-179.3	-132.5	11.270	6.29	13.57	1013.
30.	.01597	.4222	.6670	-166.4	-118.5	11.744	6.33	14.39	980.
31.	.01640	.3688	.6309	-152.9	-103.7	12.230	6.36	15.36	943.
32.	.01689	.3184	.5926	-138.4	-87.8	12.735	6.40	16.47	905.
33.	.01747	.2698	.5524	-123.1	-70.7	13.261	6.44	17.82	864.
34.	.01815	.2258	.5101	-106.5	-52.1	13.815	6.48	19.38	822.
36.	.01997	.1498	.4207	-69.4	-9.4	15.034	6.59	23.55	732.
38.	.02281	.0967	.3293	-25.5	43.0	16.450	6.75	28.93	644.
40.	.02717	.0718	.2490	23.6	105.1	18.042	6.91	32.43	580.
42.	.03273	.0711	.1916	69.8	168.0	19.579	6.93	30.16	556.
44.	.03841	.0830	.1546	108.5	223.8	20.876	6.86	25.57	556.
46.	.04369	.0984	.1306	140.0	271.1	21.928	6.79	22.00	565.
48.	.04856	.1144	.1138	166.8	312.5	22.810	6.73	19.56	576.
50.	.05311	.1299	.1015	190.5	349.8	23.572	6.70	17.89	589.
52.	.05740	.1449	.0920	212.2	384.4	24.250	6.69	16.70	601.
56.	.06543	.1732	.0782	251.8	448.1	25.431	6.72	15.18	626.
60.	.07295	.1998	.0686	288.2	507.0	26.448	6.77	14.31	649.
65.	.08185	.2307	.0598	331.2	576.7	27.564	6.91	13.65	675.
70.	.09035	.2593	.0532	373.0	644.1	28.562	7.12	13.33	698.
75.	.09858	.2877	.0480	414.7	710.4	29.478	7.39	13.23	718.
80.	.10659	.3145	.0439	456.9	776.7	30.333	7.72	13.29	736.
90.	.12217	.3658	.0376	544.8	911.3	31.918	8.50	13.69	768.
100.	.13733	.4149	.0330	639.1	1051.1	33.391	9.34	14.29	797.
110.	.15218	.4622	.0294	741.2	1197.7	34.785	10.18	14.95	824.
120.	.16683	.5085	.0266	849.8	1350.3	36.113	10.90	15.55	852.
130.	.18133	.5539	.0243	964.2	1508.2	37.377	11.46	16.02	880.
140.	.19571	.5987	.0224	1083.1	1670.2	38.577	11.87	16.36	908.
160.	.22421	.6868	.0194	1328.5	2001.1	40.786	12.25	16.65	966.
180.	.25246	.7736	.0171	1576.2	2333.6	42.745	12.22	16.55	1024.
200.	.28054	.8595	.0153	1820.3	2661.9	44.474	11.98	16.26	1080.
220.	.30851	.9446	.0139	2058.1	2983.7	46.007	11.66	15.91	1135.
240.	.33638	1.0293	.0127	2289.4	3298.5	47.377	11.35	15.58	1189.
260.	.36419	1.1135	.0117	2514.7	3607.3	48.613	11.10	15.31	1239.
280.	.39195	1.1975	.0108	2735.3	3911.1	49.739	10.89	15.09	1288.
300.	.41969	1.2816	.0101	2952.7	4211.8	50.776	10.74	14.92	1334.
350.	.48881	1.4900	.0086	3484.6	4951.1	53.055	10.52	14.68	1442.
400.	.55781	1.6977	.0075	4009.0	5682.4	55.009	10.43	14.59	1540.
450.	.62674	1.9049	.0067	4530.3	6410.5	56.725	10.41	14.56	1632.
500.	.69561	2.1119	.0060	5051.3	7138.2	58.258	10.41	14.54	1718.
550.	.76446	2.3187	.0055	5571.9	7865.3	59.644	10.41	14.55	1800
600.	.83328	2.5254	.0050	6093.3	8593.1	60.909	10.43	14.56	1878.
700.	.97087	2.9385	.0043	7138.9	10051.5	63.158	10.48	14.61	2024.
800.	1.10842	3.3513	.0038	8191.8	11517.1	65.114	10.57	14.70	2159.
900.	1.24595	3.7640	.0033	9255.4	12993.3	66.851	10.70	14.83	2284.
1000.	1.38347	4.1767	.0030	10332.9	14483.3	68.423	10.86	14.99	2401.
1200.	1.65847	5.0018	.0025	12543.4	17518.8	71.177	11.24	15.37	2615.
1400.	1.93345	5.8268	.0021	14836.2	20636.6	73.584	11.68	15.80	2808.
1600.	2.20843	6.6518	.0019	17215.2	23840.5	75.700	12.10	16.23	2986.
1800.	2.48346	7.4767	.0017	19682.9	27133.3	77.602	12.52	16.65	3153.
2000.	2.75875	8.3016	.0015	22249.8	30526.1	79.455	13.02	17.16	3308.
2200.	3.03487	9.1265	.0014	24936.1	34040.7	81.802	13.75	17.92	3450.
2400.	3.31309	9.9514	.0013	27810.7	37750.0	84.461	14.89	19.15	3578.
2600.	3.59585	10.7762	.0012	30986.1	41773.7	87.374	16.69	21.13	3693.
2800.	3.88719	11.6011	.0011	34630.3	46291.8	90.443	19.40	24.17	3800.
3000.	4.19314	12.4259	.0010	38968.3	51547.7	93.555	23.26	28.58	3904.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

3.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.772	78.6428	721.9	.25043	107.1338	.00884	84.29	273.40	.00060	1.25731	2.0698
15.	78.4822	726.8	.24911	106.6179	.00890	86.21	265.60	.00061	1.25674	1.9933
16.	77.7515	722.4	.24323	99.4716	.00959	93.11	235.84	.00062	1.25416	1.7554
17.	76.9926	720.1	.23670	92.9694	.01023	97.93	212.07	.00062	1.25149	1.5952
18.	76.1868	718.9	.22967	86.9158	.01082	101.52	192.47	.00062	1.24866	1.4746
19.	75.3438	715.1	.22288	80.8495	.01146	103.89	176.15	.00061	1.24570	1.3896
20.	74.4611	710.3	.21687	75.1511	.01213	106.09	162.34	.00060	1.24261	1.3188
21.	73.5386	704.5	.21146	69.7716	.01284	108.60	150.50	.00059	1.23938	1.2539
22.	72.5731	696.3	.20646	64.4117	.01364	110.37	140.21	.00058	1.23601	1.2066
23.	71.5604	686.3	.20172	59.1907	.01452	111.51	131.14	.00056	1.23248	1.1719
24.	70.4955	673.7	.19717	53.9663	.01554	112.09	123.04	.00055	1.22877	1.1492
25.	69.3718	659.9	.19271	48.9307	.01667	112.17	115.72	.00053	1.22487	1.1347
26.	68.1839	644.6	.18824	44.0539	.01794	111.75	109.03	.00051	1.22075	1.1284
27.	66.9234	628.3	.18359	39.3788	.01937	110.92	102.85	.00049	1.21640	1.1286
28.	65.5849	610.4	.17873	34.8590	.02103	109.72	97.09	.00047	1.21178	1.1361
29.	64.1571	591.2	.17362	30.5491	.02295	108.16	91.68	.00045	1.20687	1.1499
30.	62.6303	570.4	.16832	26.4435	.02523	106.27	86.54	.00042	1.20163	1.1717
31.	60.9904	547.6	.16254	22.4936	.02805	103.67	81.63	.00040	1.19603	1.2093
32.	59.2057	523.9	.15635	18.8488	.03144	100.76	76.87	.00037	1.18994	1.2565
33.	57.2569	498.4	.14980	15.4471	.03576	97.54	72.21	.00034	1.18332	1.3195
34.	55.1099	472.8	.14279	12.4434	.04099	94.03	67.64	.00032	1.17606	1.3942
36.	50.0718	420.0	.12752	7.5024	.05608	87.76	58.66	.00027	1.15913	1.5742
38.	43.8311	372.3	.11133	4.2386	.07769	81.47	50.05	.00023	1.13840	1.7772
40.	36.8045	344.0	.09785	2.6409	.09429	74.36	42.76	.00022	1.11536	1.8651
42.	30.5512	341.8	.09054	2.1711	.08823	67.12	37.90	.00026	1.09513	1.7028
44.	26.0341	357.2	.08655	2.1601	.07158	61.74	35.12	.00033	1.08067	1.4545
46.	22.8887	379.4	.08406	2.2517	.05799	58.56	33.56	.00042	1.07069	1.2609
48.	20.5912	404.6	.08213	2.3549	.04834	56.82	32.72	.00051	1.06344	1.1262
50.	18.8289	431.0	.08045	2.4449	.04152	55.98	32.34	.00060	1.05790	1.0337
52.	17.4203	458.3	.07892	2.5248	.03644	55.67	32.25	.00069	1.05349	.9676
56.	15.2835	514.0	.07614	2.6476	.02953	56.05	32.62	.00087	1.04682	.8831
60.	13.7071	570.7	.07392	2.7380	.02507	57.27	33.36	.00105	1.04192	.8333
65.	12.2174	643.9	.07078	2.8188	.02120	59.70	34.55	.00129	1.03730	.7899
70.	11.0676	721.4	.06747	2.8764	.01848	62.50	35.87	.00152	1.03375	.7653
75.	10.1443	804.3	.06404	2.9187	.01645	65.00	37.26	.00174	1.03090	.7586
80.	9.3815	893.3	.06059	2.9505	.01487	68.30	38.67	.00197	1.02856	.7524
90.	8.1851	1090.0	.05406	2.9939	.01256	77.47	41.51	.00249	1.02488	.7334
100.	7.2815	1308.1	.04853	3.0208	.01092	86.78	44.31	.00300	1.02211	.7297
110.	6.5711	1543.6	.04397	3.0369	.00969	96.16	45.92	.00352	1.01994	.7141
120.	5.9941	1780.6	.04075	3.0477	.00873	106.29	48.56	.00411	1.01818	.7104
130.	5.5148	2013.1	.03847	3.0547	.00796	115.89	51.17	.00472	1.01672	.7074
140.	5.1097	2235.1	.03692	3.0591	.00732	124.47	53.73	.00536	1.01548	.7064
160.	4.4602	2632.5	.03545	3.0635	.00632	138.48	58.72	.00671	1.01350	.7059
180.	3.9610	2968.1	.03530	3.0643	.00558	149.24	63.54	.00819	1.01199	.7046
200.	3.5645	3256.7	.03584	3.0635	.00499	158.05	68.20	.00982	1.01078	.7017
220.	3.2414	3517.2	.03666	3.0618	.00452	165.81	72.72	.01157	1.00980	.6979
240.	2.9728	3765.8	.03751	3.0598	.00414	173.10	77.13	.01345	1.00899	.6942
260.	2.7458	4013.4	.03827	3.0575	.00381	180.24	81.42	.01544	1.00830	.6914
280.	2.5514	4265.0	.03889	3.0552	.00354	187.39	85.60	.01752	1.00771	.6892
300.	2.3827	4524.1	.03936	3.0536	.00330	194.62	89.70	.01971	1.00720	.6876
350.	2.0458	5197.5	.04001	3.0481	.00283	213.09	99.58	.02554	1.00618	.6862
400.	1.7927	5899.5	.04022	3.0434	.00247	231.88	109.01	.03192	1.00541	.6857
450.	1.5956	6620.7	.04022	3.0394	.00220	250.65	118.07	.03885	1.00482	.6857
500.	1.4376	7346.7	.04018	3.0360	.00198	269.19	126.81	.04635	1.00434	.6852
550.	1.3081	8079.3	.04010	3.0331	.00180	287.41	135.27	.05437	1.00395	.6848
600.	1.2001	8816.9	.03999	3.0307	.00165	305.31	143.49	.06290	1.00362	.6844
700.	1.0300	10313.1	.03972	3.0266	.00142	340.40	159.30	.08141	1.00311	.6839
800.	.9022	11848.5	.03933	3.0235	.00124	375.06	174.41	.10179	1.00272	.6837
900.	.8026	13434.0	.03883	3.0210	.00110	409.77	188.94	.12396	1.00242	.6837
1000.	.7228	15077.2	.03823	3.0190	.00099	444.85	202.99	.14784	1.00218	.6838
1200.	.6030	18538.1	.03688	3.0159	.00083	511.13	229.90	.19856	1.00182	.6913
1400.	.5172	22225.9	.03548	3.0137	.00071	583.37	255.52	.25692	1.00156	.6923
1600.	.4528	26066.8	.03422	3.0120	.00062	655.89	280.07	.32134	1.00136	.6929
1800.	.4027	30069.6	.03307	3.0106	.00055	730.16	303.69	.39214	1.00121	.6924
2000.	.3625	34432.3	.03178	3.0092	.00050	813.70	326.45	.47083	1.00109	.6886
2200.	.3295	39529.1	.03011	3.0072	.00045	920.98	344.92	.55135	1.00099	.6713
2400.	.3018	46022.4	.02782	3.0036	.00042	1077.03	366.35	.67070	1.00091	.6515
2600.	.2781	54878.9	.02487	2.9968	.00039	1318.09	387.48	.80753	1.00084	.6211
2800.	.2573	67319.1	.02147	2.9844	.00036	1689.77	408.56	.97842	1.00078	.5843
3000.	.2385	84685.3	.01803	2.9634	.00034	2242.45	429.96	1.18453	1.00072	.5479

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

3.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.927	.01267	1.3929	.9496	-307.2	-262.9	5.047	4.83	6.38	1357.
15.	.01268	1.3951	.9505	-306.8	-262.4	5.079	4.84	6.41	1358.
16.	.01280	1.3237	.9576	-300.5	-255.7	5.507	5.04	6.85	1342.
17.	.01292	1.2538	.9572	-293.9	-248.7	5.935	5.21	7.28	1324.
18.	.01305	1.1850	.9506	-286.9	-241.2	6.364	5.37	7.71	1304.
19.	.01319	1.1224	.9370	-279.5	-233.3	6.791	5.51	8.10	1284.
20.	.01334	1.0577	.9228	-271.7	-225.0	7.217	5.64	8.50	1263.
21.	.01350	.9958	.9075	-263.5	-216.3	7.641	5.75	8.92	1243.
22.	.01368	.9357	.8908	-255.0	-207.2	8.066	5.86	9.35	1222.
23.	.01386	.8759	.8726	-246.1	-197.6	8.491	5.95	9.79	1201.
24.	.01406	.8161	.8525	-236.8	-187.6	8.917	6.03	10.25	1178.
25.	.01427	.7561	.8307	-227.0	-177.1	9.346	6.10	10.74	1154.
26.	.01451	.6973	.8068	-216.9	-166.1	9.777	6.16	11.26	1130.
27.	.01476	.6399	.7809	-206.2	-154.5	10.213	6.21	11.82	1104.
28.	.01504	.5828	.7530	-195.1	-142.4	10.653	6.26	12.42	1076.
29.	.01535	.5285	.7232	-183.4	-129.7	11.100	6.30	13.06	1047.
30.	.01569	.4773	.6917	-171.2	-116.3	11.554	6.33	13.73	1017.
31.	.01606	.4258	.6585	-158.4	-102.2	12.016	6.35	14.51	985.
32.	.01649	.3763	.6236	-145.0	-87.2	12.491	6.40	15.39	951.
33.	.01697	.3294	.5872	-130.8	-71.4	12.980	6.43	16.37	916.
34.	.01752	.2847	.5494	-115.8	-54.4	13.485	6.46	17.53	879.
36.	.01891	.2077	.4703	-83.0	-16.8	14.560	6.54	20.25	802.
38.	.02084	.1481	.3899	-46.0	27.0	15.743	6.63	23.57	726.
40.	.02356	.1099	.3140	-5.1	77.4	17.035	6.73	26.65	660.
42.	.02717	.0926	.2509	37.3	132.4	18.376	6.82	27.90	615.
44.	.03140	.0917	.2035	77.2	187.1	19.649	6.84	26.43	595.
46.	.03578	.1007	.1699	111.5	236.8	20.753	6.83	23.72	591.
48.	.04000	.1135	.1462	141.6	281.6	21.707	6.79	21.24	596.
50.	.04401	.1278	.1288	168.0	322.1	22.534	6.76	19.33	605.
52.	.04782	.1421	.1156	191.9	359.2	23.263	6.75	17.92	614.
56.	.05495	.1703	.0967	234.8	427.1	24.521	6.76	16.05	636.
60.	.06159	.1970	.0838	273.3	488.9	25.587	6.81	14.93	657.
65.	.06947	.2289	.0725	318.4	561.5	26.751	6.94	14.14	683.
70.	.07695	.2588	.0640	361.7	631.0	27.781	7.15	13.71	705.
75.	.08415	.2874	.0576	404.6	699.1	28.720	7.42	13.54	724.
80.	.09115	.3148	.0524	447.7	766.7	29.593	7.74	13.54	742.
90.	.10472	.3672	.0447	537.0	903.5	31.204	8.51	13.87	774.
100.	.11788	.4172	.0390	632.3	1044.9	32.693	9.35	14.43	802.
110.	.13073	.4651	.0347	735.3	1192.8	34.100	10.20	15.07	829.
120.	.14339	.5120	.0313	844.5	1346.4	35.437	10.91	15.64	857.
130.	.15590	.5580	.0286	959.5	1505.1	36.707	11.47	16.10	885.
140.	.16830	.6032	.0263	1078.8	1667.9	37.913	11.88	16.43	913.
160.	.19285	.6921	.0227	1324.9	1999.9	40.129	12.26	16.70	971.
180.	.21716	.7794	.0200	1573.1	2333.2	42.093	12.23	16.59	1028.
200.	.24130	.8657	.0179	1817.6	2662.2	43.825	11.98	16.29	1085.
220.	.26533	.9512	.0162	2055.8	2984.4	45.361	11.66	15.94	1140.
240.	.28927	1.0361	.0148	2287.3	3299.7	46.733	11.36	15.60	1193.
260.	.31314	1.1206	.0136	2512.9	3608.9	47.970	11.10	15.32	1244.
280.	.33697	1.2048	.0126	2733.6	3913.0	49.098	10.90	15.10	1292.
300.	.36079	1.2892	.0118	2951.2	4214.0	50.136	10.74	14.93	1339.
350.	.42009	1.4979	.0101	3483.5	4953.8	52.416	10.52	14.69	1446.
400.	.47926	1.7058	.0088	4008.1	5685.5	54.371	10.44	14.59	1544.
450.	.53837	1.9132	.0078	4529.5	6413.8	56.088	10.41	14.56	1636.
500.	.59742	2.1203	.0070	5050.7	7141.7	57.621	10.41	14.55	1722.
550.	.65644	2.3272	.0064	5571.4	7868.9	59.007	10.41	14.55	1803.
600.	.71544	2.5339	.0058	6092.9	8596.9	60.272	10.43	14.56	1881.
700.	.83339	2.9470	.0050	7138.5	10055.4	62.522	10.48	14.61	2027.
800.	.95131	3.3600	.0044	8191.5	11521.1	64.478	10.57	14.70	2161.
900.	1.06920	3.7727	.0039	9255.2	12997.4	66.215	10.70	14.83	2286.
1000.	1.18707	4.1854	.0035	10332.7	14487.5	67.787	10.86	14.99	2403.
1200.	1.42280	5.0106	.0029	12543.3	17523.1	70.542	11.24	15.37	2617.
1400.	1.65850	5.8356	.0025	14836.1	20640.9	72.948	11.68	15.80	2810.
1600.	1.89420	6.6606	.0022	17215.1	23844.8	75.065	12.10	16.23	2988.
1800.	2.12994	7.4855	.0019	19682.4	27137.2	76.966	12.51	16.64	3155.
2000.	2.36588	8.3104	.0018	22247.4	30528.0	78.818	13.01	17.15	3310.
2200.	2.60248	9.1353	.0016	24927.8	34036.5	81.162	13.70	17.88	3452.
2400.	2.84075	9.9601	.0015	27787.3	37729.9	83.814	14.78	19.04	3581.
2600.	3.08263	10.7850	.0013	30929.6	41718.8	86.713	16.47	20.89	3698.
2800.	3.33131	11.6099	.0012	34509.9	46169.5	89.758	19.00	23.72	3806.
3000.	3.59160	12.4347	.0012	38736.3	51306.9	92.829	22.59	27.82	3910.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

3.50 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	14.927	78.8975	738.4	.24927	109.8930	.00864	86.07	276.50	.00062	1.25820	2.0439
	15.	78.8440	741.3	.24890	109.9949	.00864	86.68	273.88	.00062	1.25802	2.0242
	16.	78.1394	740.2	.24329	103.4356	.00926	93.74	243.10	.00063	1.25553	1.7771
	17.	77.3997	738.6	.23732	97.0466	.00986	98.70	218.42	.00063	1.25292	1.6121
	18.	76.6149	736.0	.23117	90.7901	.01047	102.42	198.10	.00062	1.25016	1.4905
	19.	75.7943	735.1	.22439	85.0704	.01101	104.90	181.21	.00062	1.24728	1.3987
	20.	74.9428	730.5	.21842	79.2684	.01164	107.22	167.01	.00061	1.24429	1.3246
	21.	74.0524	724.8	.21303	73.7426	.01231	109.86	154.84	.00060	1.24118	1.2571
	22.	73.1206	717.8	.20806	68.4215	.01302	111.77	144.27	.00059	1.23792	1.2063
	23.	72.1477	708.8	.20339	63.1958	.01381	113.04	134.99	.00058	1.23452	1.1687
	24.	71.1269	697.9	.19890	58.0441	.01469	113.76	126.73	.00056	1.23097	1.1420
	25.	70.0562	685.1	.19453	52.9691	.01568	113.99	119.30	.00055	1.22725	1.1244
	26.	68.9286	671.0	.19016	48.0622	.01679	113.73	112.54	.00053	1.22333	1.1146
	27.	67.7393	655.9	.18568	43.3470	.01802	113.08	106.33	.00051	1.21922	1.1111
	28.	66.4831	639.0	.18105	38.7445	.01944	112.07	100.56	.00049	1.21488	1.1145
	29.	65.1537	621.7	.17629	34.4342	.02100	110.73	95.18	.00047	1.21030	1.1223
	30.	63.7444	604.0	.17143	30.4265	.02273	109.09	90.10	.00045	1.20545	1.1340
	31.	62.2492	584.1	.16625	26.5052	.02485	106.77	85.30	.00043	1.20033	1.1593
	32.	60.6468	563.1	.16074	22.8203	.02733	104.19	80.69	.00040	1.19485	1.1917
	33.	58.9267	541.4	.15500	19.4132	.03025	101.38	76.24	.00038	1.18899	1.2314
	34.	57.0738	518.4	.14897	16.2475	.03382	98.37	71.93	.00035	1.18270	1.2818
	36.	52.8898	472.8	.13606	10.9834	.04282	91.89	63.65	.00031	1.16858	1.4023
	38.	47.9855	423.5	.12258	7.1055	.05487	86.47	55.87	.00028	1.15217	1.5228
	40.	42.4430	396.0	.10991	4.6658	.06730	80.55	48.93	.00026	1.13382	1.6192
	42.	36.8054	379.0	.09996	3.4086	.07362	74.55	43.44	.00026	1.11536	1.6258
	44.	31.8437	379.4	.09348	2.9211	.06968	69.12	39.67	.00030	1.09929	1.5170
	46.	27.9523	392.7	.08907	2.8134	.06040	64.98	37.31	.00035	1.08680	1.3616
	48.	25.0017	412.5	.08614	2.8385	.05150	62.26	35.85	.00042	1.07739	1.2230
	50.	22.7238	435.8	.08386	2.9033	.04437	60.62	34.97	.00050	1.07017	1.1152
	52.	20.9139	460.8	.08192	2.9720	.03889	59.71	34.48	.00057	1.06445	1.0348
	56.	18.1994	514.3	.07859	3.0997	.03120	59.27	34.26	.00073	1.05593	.9276
	60.	16.2361	569.7	.07582	3.1993	.02621	59.96	34.64	.00089	1.04979	.8627
	65.	14.3943	643.0	.07248	3.2950	.02199	61.98	35.54	.00110	1.04405	.8107
	70.	12.9961	720.4	.06895	3.3640	.01934	64.48	36.68	.00130	1.03971	.7802
	75.	11.8836	803.2	.06533	3.4150	.01686	66.68	37.95	.00149	1.03627	.7705
	80.	10.9709	892.3	.06171	3.4537	.01517	69.83	39.27	.00169	1.03345	.7615
	90.	9.5497	1089.1	.05494	3.5064	.01273	78.82	41.99	.00214	1.02907	.7389
	100.	8.4835	1307.7	.04923	3.5390	.01103	87.99	44.72	.00259	1.02580	.7333
	110.	7.6496	1544.4	.04450	3.5582	.00976	97.08	46.24	.00303	1.02324	.7177
	120.	6.9740	1782.2	.04119	3.5710	.00877	107.07	48.83	.00353	1.02117	.7132
	130.	6.4142	2015.7	.03885	3.5791	.00799	116.57	51.40	.00406	1.01946	.7098
	140.	5.9417	2238.7	.03726	3.5842	.00734	125.06	53.92	.00461	1.01802	.7084
	160.	5.1854	2638.1	.03573	3.5888	.00633	138.93	58.87	.00578	1.01571	.7075
	180.	4.6050	2975.3	.03554	3.5892	.00558	149.60	63.66	.00705	1.01394	.7059
	200.	4.1442	3265.2	.03605	3.5876	.00499	158.34	68.30	.00844	1.01254	.7027
	220.	3.7689	3526.7	.03685	3.5850	.00452	166.05	72.81	.00995	1.01140	.6988
	240.	3.4570	3776.2	.03769	3.5819	.00413	173.31	77.20	.01157	1.01045	.6950
	260.	3.1934	4024.4	.03844	3.5787	.00381	180.42	81.48	.01327	1.00965	.6920
	280.	2.9676	4276.5	.03905	3.5754	.00353	187.55	85.66	.01506	1.00897	.6898
	300.	2.7717	4536.5	.03951	3.5733	.00329	194.76	89.75	.01694	1.00838	.6881
	350.	2.3805	5210.5	.04013	3.5657	.00282	213.19	99.62	.02194	1.00719	.6865
	400.	2.0865	5913.1	.04033	3.5592	.00247	231.97	109.04	.02743	1.00630	.6859
	450.	1.8575	6634.7	.04032	3.5537	.00219	250.73	118.10	.03337	1.00561	.6859
	500.	1.6739	7360.9	.04027	3.5490	.00198	269.25	126.84	.03981	1.00505	.6853
	550.	1.5234	8093.7	.04018	3.5451	.00180	287.46	135.30	.04668	1.00460	.6849
	600.	1.3977	8831.6	.04007	3.5417	.00165	305.35	143.51	.05400	1.00422	.6845
	700.	1.1999	10328.0	.03978	3.5362	.00142	340.44	159.31	.06989	1.00362	.6839
	800.	1.0512	11863.7	.03938	3.5319	.00124	375.09	174.42	.08737	1.00317	.6837
	900.	.9353	13449.4	.03887	3.5285	.00110	409.80	188.95	.10638	1.00282	.6837
	1000.	.8424	15092.9	.03827	3.5258	.00099	444.88	203.00	.12686	1.00254	.6838
	1200.	.7028	18554.3	.03691	3.5216	.00083	511.13	229.91	.17034	1.00212	.6913
	1400.	.6030	22242.5	.03550	3.5186	.00071	583.36	255.53	.22038	1.00182	.6923
	1600.	.5279	26082.6	.03424	3.5163	.00062	655.84	280.08	.27561	1.00159	.6930
	1800.	.4695	30079.1	.03310	3.5144	.00055	729.84	303.69	.33626	1.00142	.6925
	2000.	.4227	34416.8	.03183	3.5126	.00050	812.40	326.45	.40353	1.00127	.6890
	2200.	.3842	39441.4	.03022	3.5102	.00045	916.91	344.92	.48056	1.00116	.6724
	2400.	.3520	45766.0	.02803	3.5062	.00042	1066.54	366.34	.57299	1.00106	.6538
	2600.	.3244	54285.9	.02520	3.4986	.00038	1294.89	387.44	.68798	1.00098	.6250
	2800.	.3002	66134.2	.02192	3.4851	.00036	1644.32	408.46	.83134	1.00090	.5892
	3000.	.2784	82563.1	.01855	3.4622	.00034	2161.83	429.75	1.00469	1.00084	.5531

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

4.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 15.080	.01263	1.4112	.9524	-306.9	-256.4	5.059	4.85	6.39	1364.
16.	.01274	1.3667	.9608	-301.3	-250.3	5.448	5.33	6.78	1358.
17.	.01286	1.2950	.9624	-294.7	-243.3	5.873	5.20	7.21	1340.
18.	.01298	1.2281	.9572	-287.8	-235.9	6.297	5.36	7.62	1322.
19.	.01312	1.1684	.9466	-280.5	-228.1	6.720	5.50	8.01	1304.
20.	.01326	1.1021	.9333	-272.9	-219.9	7.140	5.63	8.41	1283.
21.	.01341	1.0393	.9185	-264.9	-211.3	7.560	5.74	8.81	1263.
22.	.01358	.9817	.9023	-256.6	-202.2	7.979	5.85	9.21	1244.
23.	.01375	.9227	.8848	-247.8	-192.8	8.398	5.94	9.63	1223.
24.	.01394	.8638	.8656	-238.7	-183.0	8.817	6.02	10.07	1202.
25.	.01414	.8051	.8448	-229.3	-172.7	9.237	6.09	10.52	1179.
26.	.01436	.7467	.8221	-219.4	-161.9	9.660	6.15	11.01	1156.
27.	.01460	.6877	.7975	-209.1	-150.7	10.085	6.21	11.53	1130.
28.	.01486	.6334	.7712	-198.3	-138.9	10.513	6.26	12.06	1105.
29.	.01514	.5804	.7431	-187.1	-126.5	10.946	6.30	12.62	1078.
30.	.01545	.5290	.7135	-175.4	-113.6	11.384	6.33	13.22	1051.
31.	.01578	.4784	.6827	-163.2	-100.1	11.828	6.37	13.89	1022.
32.	.01616	.4311	.6504	-150.4	-85.8	12.281	6.40	14.60	992.
33.	.01657	.3833	.6169	-137.1	-70.8	12.742	6.43	15.43	959.
34.	.01704	.3410	.5822	-123.2	-55.0	13.215	6.46	16.27	927.
36.	.01817	.2623	.5102	-93.1	-20.5	14.201	6.51	18.31	859.
38.	.01965	.1993	.4371	-60.1	18.5	15.253	6.58	20.64	791.
40.	.02161	.1532	.3666	-24.3	62.1	16.372	6.64	23.02	729.
42.	.02413	.1259	.3036	13.4	110.0	17.539	6.71	24.62	680.
44.	.02719	.1135	.2519	51.0	159.8	18.698	6.76	24.95	647.
46.	.03060	.1131	.2117	85.8	208.3	19.774	6.81	23.87	630.
48.	.03412	.1204	.1813	117.7	254.2	20.753	6.81	22.06	625.
50.	.03759	.1314	.1586	146.3	296.6	21.619	6.79	20.33	627.
52.	.04095	.1439	.1413	172.0	335.8	22.387	6.79	18.88	633.
56.	.04730	.1702	.1168	217.9	407.1	23.710	6.80	16.83	649.
60.	.05325	.1967	.1003	258.7	471.7	24.824	6.84	15.54	668.
65.	.06027	.2283	.0859	305.7	546.7	26.026	6.97	14.59	691.
70.	.06699	.2590	.0754	350.6	618.5	27.090	7.17	14.07	713.
75.	.07341	.2880	.0675	394.6	688.2	28.051	7.44	13.83	732.
80.	.07964	.3159	.0612	438.6	757.2	28.942	7.76	13.78	749.
90.	.09168	.3692	.0519	529.3	896.0	30.577	8.52	14.04	780.
100.	.10333	.4200	.0452	625.6	1038.9	32.082	9.36	14.56	808.
110.	.11467	.4685	.0401	729.5	1188.1	33.502	10.21	15.18	834.
120.	.12584	.5160	.0361	839.3	1342.7	34.847	10.92	15.73	862.
130.	.13686	.5624	.0329	954.8	1502.2	36.123	11.48	16.17	890.
140.	.14777	.6080	.0303	1074.5	1665.6	37.334	11.89	16.49	918.
160.	.16935	.6975	.0261	1321.3	1998.7	39.557	12.27	16.74	976.
180.	.19069	.7854	.0230	1570.0	2332.8	41.526	12.23	16.53	1033.
200.	.21188	.8721	.0205	1814.9	2662.4	43.261	11.99	16.32	1090.
220.	.23295	.9579	.0186	2053.4	2985.2	44.800	11.67	15.96	1145.
240.	.25394	1.0431	.0169	2285.2	3300.9	46.174	11.36	15.62	1198.
260.	.27486	1.1278	.0156	2511.0	3610.4	47.413	11.10	15.34	1248.
280.	.29574	1.2122	.0144	2732.0	3914.9	48.541	10.90	15.12	1297.
300.	.31662	1.2969	.0135	2949.8	4216.3	49.581	10.74	14.94	1343.
350.	.36854	1.5058	.0115	3482.4	4956.6	51.862	10.53	14.70	1450.
400.	.42035	1.7139	.0100	4007.2	5688.6	53.819	10.44	14.60	1548.
450.	.47209	1.9215	.0089	4528.8	6417.2	55.536	10.42	14.56	1639.
500.	.52378	2.1287	.0080	5050.1	7145.2	57.069	10.41	14.55	1725.
550.	.57543	2.3356	.0073	5570.9	7872.6	58.455	10.41	14.55	1807.
600.	.62706	2.5424	.0067	6092.4	8600.7	59.721	10.43	14.57	1884.
700.	.73029	2.9556	.0057	7138.2	10059.4	61.971	10.48	14.62	2030.
800.	.83347	3.3686	.0050	8191.3	11525.2	63.927	10.57	14.70	2164.
900.	.93663	3.7814	.0044	9255.0	13001.6	65.664	10.70	14.83	2289.
1000.	1.03977	4.1941	.0040	10332.6	14491.6	67.237	10.86	14.99	2406.
1200.	1.24604	5.0193	.0033	12543.2	17527.3	69.991	11.24	15.37	2619.
1400.	1.45228	5.8443	.0029	14836.1	20645.2	72.398	11.68	15.80	2812.
1600.	1.65852	6.6693	.0025	17215.0	23849.1	74.514	12.10	16.23	2990.
1800.	1.86479	7.4942	.0022	19681.9	27141.1	76.415	12.51	16.64	3157.
2000.	2.07123	8.3192	.0020	22245.5	30530.4	78.266	12.99	17.13	3312.
2200.	2.27820	9.1440	.0018	24921.1	34033.9	80.607	13.66	17.84	3455.
2400.	2.48654	9.9689	.0017	27768.4	37714.5	83.254	14.69	18.94	3585.
2600.	2.69784	10.7938	.0015	30884.0	41675.4	86.142	16.29	20.69	3702.
2800.	2.91471	11.6186	.0014	34412.8	46071.7	89.167	18.68	23.36	3811.
3000.	3.14109	12.4435	.0013	38549.3	51113.7	92.205	22.06	27.21	3915.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

4.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	M/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 15.080	79.1477	750.0	.24825	111.6967	.00853	87.81	279.60	.00062	1.25909	2.0363
16.	78.5151	757.3	.24339	107.3080	.00895	94.35	250.48	.00064	1.25686	1.8001
17.	77.7893	755.0	.23774	100.7400	.00955	99.43	224.78	.00064	1.25430	1.6305
18.	77.0297	753.5	.23179	94.5996	.01012	103.29	203.80	.00063	1.25162	1.5044
19.	76.2330	753.7	.22567	89.0699	.01063	105.88	186.36	.00062	1.24882	1.4097
20.	75.4072	748.8	.21984	83.1052	.01123	108.33	171.72	.00061	1.24592	1.3330
21.	74.5439	743.3	.21449	77.4730	.01186	111.09	159.18	.00061	1.24290	1.2627
22.	73.6412	738.1	.20952	72.2903	.01248	113.11	148.31	.00060	1.23974	1.2060
23.	72.7031	730.2	.20492	67.0801	.01319	114.51	138.81	.00059	1.23646	1.1676
24.	71.7214	720.6	.20047	61.9555	.01397	115.35	130.37	.00058	1.23304	1.1378
25.	70.6965	709.1	.19619	56.9160	.01484	115.72	122.82	.00056	1.22947	1.1170
26.	69.6206	696.1	.19190	51.9873	.01581	115.60	115.96	.00054	1.22573	1.1041
27.	68.4918	681.1	.18756	47.1047	.01693	115.10	109.69	.00052	1.22182	1.0989
28.	67.3048	666.8	.18310	42.6332	.01809	114.26	103.90	.00051	1.21771	1.0968
29.	66.0553	651.3	.17857	38.3406	.01938	113.10	98.51	.00049	1.21340	1.0995
30.	64.7413	634.6	.17400	34.2491	.02083	111.67	93.47	.00047	1.20888	1.1067
31.	63.3553	616.7	.16924	30.3107	.02252	109.56	88.72	.00045	1.20412	1.1247
32.	61.8867	598.8	.16425	26.6805	.02438	107.24	84.19	.00043	1.19909	1.1459
33.	60.3319	578.4	.15908	23.1270	.02667	104.73	79.88	.00041	1.19378	1.1766
34.	58.6740	559.2	.15369	20.0072	.02910	102.05	75.72	.00038	1.18813	1.2073
36.	55.0254	518.1	.14234	14.4332	.03535	96.17	67.85	.00034	1.17577	1.2920
38.	50.8854	479.0	.13059	10.1427	.04309	90.72	60.55	.00031	1.16186	1.3777
40.	46.2851	445.2	.11926	7.0906	.05170	85.54	53.96	.00029	1.14652	1.4520
42.	41.4430	423.0	.10917	5.2174	.05819	80.22	48.39	.00028	1.13053	1.4850
44.	36.7771	413.5	.10127	4.1750	.06034	75.26	44.10	.00030	1.11527	1.4621
46.	32.6747	416.9	.09513	3.6962	.05727	70.99	41.07	.00033	1.10197	1.3812
48.	29.3046	429.5	.09090	3.5296	.05137	67.69	39.07	.00038	1.09113	1.2733
50.	26.6002	447.8	.08777	3.4940	.04540	65.41	37.76	.00044	1.08248	1.1734
52.	24.4207	469.6	.08527	3.5143	.04020	63.94	36.91	.00050	1.07554	1.0930
56.	21.1407	518.8	.08124	3.5988	.03244	62.65	36.13	.00063	1.06517	.9707
60.	18.7786	572.4	.07805	3.6932	.02715	62.78	36.10	.00077	1.05774	.8938
65.	16.5932	643.9	.07423	3.7886	.02266	64.35	36.67	.00096	1.05090	.8315
70.	14.9280	721.3	.07042	3.8661	.01950	66.52	37.59	.00114	1.04571	.7949
75.	13.6221	804.0	.06663	3.9234	.01721	68.42	38.70	.00131	1.04165	.7826
80.	12.5567	892.8	.06286	3.9672	.01544	71.41	39.92	.00149	1.03835	.7706
90.	10.9079	1089.6	.05583	4.0274	.01289	80.20	42.51	.00188	1.03326	.7444
100.	9.6782	1308.5	.04993	4.0646	.01113	89.23	45.15	.00228	1.02947	.7368
110.	8.7207	1546.4	.04503	4.0861	.00981	98.05	46.60	.00267	1.02652	.7213
120.	7.9469	1784.9	.04163	4.1004	.00881	107.91	49.13	.00311	1.02415	.7160
130.	7.3068	2019.2	.03923	4.1093	.00801	117.29	51.64	.00357	1.02219	.7121
140.	6.7673	2243.1	.03760	4.1147	.00735	125.68	54.14	.00405	1.02054	.7103
160.	5.9050	2644.2	.03600	4.1190	.00633	139.40	59.03	.00508	1.01791	.7090
180.	5.2440	2983.0	.03578	4.1185	.00557	149.98	63.79	.00619	1.01589	.7071
200.	4.7197	3274.1	.03626	4.1158	.00498	158.64	68.41	.00741	1.01429	.7037
220.	4.2927	3536.6	.03705	4.1120	.00451	166.30	72.90	.00874	1.01299	.6996
240.	3.9379	3786.8	.03788	4.1077	.00413	173.52	77.28	.01015	1.01192	.6957
260.	3.6382	4035.6	.03861	4.1033	.00380	180.60	81.55	.01165	1.01100	.6926
280.	3.3814	4288.2	.03921	4.0989	.00353	187.71	85.72	.01322	1.01023	.6904
300.	3.1584	4548.9	.03965	4.0961	.00329	194.90	89.81	.01487	1.00955	.6886
350.	2.7134	5223.7	.04026	4.0859	.00281	213.30	99.66	.01925	1.00820	.6868
400.	2.3790	5926.7	.04044	4.0774	.00246	232.05	109.08	.02406	1.00719	.6862
450.	2.1183	6648.7	.04041	4.0702	.00219	250.80	118.13	.02926	1.00640	.6860
500.	1.9092	7375.2	.04035	4.0641	.00197	269.31	126.86	.03490	1.00576	.6854
550.	1.7378	8108.2	.04025	4.0589	.00179	287.51	135.32	.04092	1.00525	.6850
600.	1.5947	8846.2	.04014	4.0544	.00165	305.40	143.53	.04733	1.00481	.6845
700.	1.3693	10343.0	.03984	4.0472	.00141	340.48	159.33	.06124	1.00413	.6840
800.	1.1998	11878.9	.03943	4.0417	.00124	375.12	174.43	.07655	1.00362	.6837
900.	1.0677	13464.9	.03892	4.0372	.00110	409.83	188.96	.09319	1.00322	.6837
1000.	.9617	15108.6	.03831	4.0336	.00099	444.90	203.01	.11112	1.00290	.6839
1200.	.8025	18570.5	.03695	4.0282	.00083	511.13	229.92	.14918	1.00242	.6914
1400.	.6886	22259.1	.03553	4.0242	.00071	583.36	255.54	.19297	1.00208	.6923
1600.	.6029	26098.7	.03427	4.0212	.00062	655.79	280.08	.24131	1.00182	.6930
1800.	.5363	30090.2	.03312	4.0188	.00055	729.58	303.70	.29436	1.00162	.6926
2000.	.4828	34407.7	.03188	4.0165	.00050	811.35	326.46	.35310	1.00146	.6894
2200.	.4389	39374.3	.03031	4.0137	.00045	913.62	344.92	.42010	1.00132	.6734
2400.	.4022	45563.0	.02820	4.0091	.00042	1058.09	366.33	.50005	1.00121	.6558
2600.	.3707	53811.5	.02548	4.0009	.00038	1276.19	387.41	.59901	1.00112	.6281
2800.	.3431	65182.1	.02229	3.9862	.00036	1607.64	408.39	.72214	1.00103	.5934
3000.	.3184	80853.3	.01899	3.9615	.00034	2096.71	429.59	.87127	1.00096	.5576

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

5.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 15.382	.01256	1.4746	.9589	-306.2	-243.4	5.081	4.88	6.40	1390.
16.	.01262	1.4419	.9656	-302.5	-239.4	5.338	5.01	6.66	1384.
17.	.01273	1.3771	.9705	-296.2	-232.5	5.754	5.19	7.07	1370.
18.	.01285	1.3108	.9690	-289.5	-225.2	6.170	5.35	7.48	1354.
19.	.01298	1.2480	.9623	-282.5	-217.6	6.585	5.49	7.87	1337.
20.	.01311	1.1937	.9514	-275.1	-209.5	6.998	5.62	8.22	1322.
21.	.01325	1.1291	.9383	-267.4	-201.1	7.408	5.73	8.51	1302.
22.	.01340	1.0703	.9233	-259.3	-192.3	7.818	5.84	8.98	1284.
23.	.01356	1.0116	.9071	-250.9	-183.1	8.225	5.93	9.37	1264.
24.	.01373	.9542	.8895	-242.2	-173.6	8.632	6.01	9.76	1245.
25.	.01391	.8976	.8703	-233.2	-163.6	9.039	6.08	10.17	1225.
26.	.01411	.8409	.8497	-223.8	-153.2	9.446	6.15	10.59	1204.
27.	.01432	.7852	.8274	-214.0	-142.4	9.854	6.21	11.03	1181.
28.	.01454	.7307	.8035	-203.9	-131.2	10.264	6.26	11.49	1158.
29.	.01478	.6782	.7782	-193.3	-119.4	10.675	6.31	11.97	1134.
30.	.01504	.6262	.7516	-182.4	-107.2	11.089	6.34	12.47	1109.
31.	.01533	.5776	.7238	-171.1	-94.5	11.506	6.38	12.98	1084.
32.	.01563	.5319	.6951	-159.4	-81.3	11.927	6.41	13.51	1059.
33.	.01597	.4873	.6657	-147.3	-67.4	12.352	6.44	14.09	1033.
34.	.01633	.4434	.6355	-134.7	-53.1	12.781	6.46	14.72	1005.
36.	.01717	.3645	.5731	-108.2	-22.3	13.659	6.51	16.07	949.
38.	.01820	.2981	.5095	-79.7	11.2	14.566	6.55	17.51	893.
40.	.01945	.2443	.4470	-49.5	47.7	15.502	6.58	18.96	839.
42.	.02098	.2041	.3883	-17.9	87.0	16.461	6.62	20.28	791.
44.	.02281	.1771	.3356	14.6	128.6	17.428	6.66	21.22	751.
46.	.02491	.1615	.2903	46.5	171.0	18.370	6.73	21.53	720.
48.	.02724	.1555	.2525	77.9	214.1	19.287	6.78	21.39	701.
50.	.02970	.1565	.2217	107.7	256.2	20.147	6.80	20.66	689.
52.	.03222	.1620	.1967	135.5	296.6	20.939	6.82	19.71	684.
56.	.03721	.1808	.1604	185.9	371.9	22.335	6.85	17.88	687.
60.	.04202	.2035	.1358	230.4	440.5	23.518	6.89	16.50	698.
65.	.04776	.2333	.1147	281.1	519.9	24.789	7.01	15.37	715.
70.	.05325	.2631	.0997	328.7	594.9	25.902	7.21	14.72	733.
75.	.05853	.2918	.0886	374.9	667.5	26.904	7.47	14.38	749.
80.	.06365	.3204	.0799	420.8	739.0	27.827	7.79	14.25	765.
90.	.07355	.3752	.0670	514.2	882.0	29.511	8.55	14.37	794.
100.	.08306	.4271	.0580	612.5	1027.8	31.046	9.38	14.81	821.
110.	.09227	.4766	.0511	718.1	1179.5	32.490	10.24	15.38	846.
120.	.10133	.5249	.0459	829.2	1335.8	33.851	10.94	15.90	873.
130.	.11025	.5720	.0417	945.6	1496.9	35.140	11.50	16.31	901.
140.	.11907	.6184	.0383	1066.2	1661.6	36.360	11.91	16.51	929.
160.	.13648	.7090	.0329	1314.3	1996.7	38.597	12.28	16.83	986.
180.	.15367	.7977	.0289	1564.0	2332.4	40.574	12.25	16.70	1043.
200.	.17071	.8851	.0258	1809.7	2663.2	42.317	12.00	16.38	1099.
220.	.18764	.9716	.0233	2048.8	2987.0	43.860	11.68	16.01	1154.
240.	.20449	1.0573	.0213	2281.1	3303.5	45.237	11.37	15.66	1207.
260.	.22128	1.1424	.0196	2507.3	3613.7	46.479	11.11	15.37	1257.
280.	.23802	1.2271	.0181	2728.7	3918.8	47.610	10.91	15.14	1305.
300.	.25478	1.3124	.0169	2947.0	4220.9	48.651	10.75	14.97	1352.
350.	.29639	1.5219	.0144	3480.2	4962.1	50.936	10.53	14.72	1458.
400.	.33788	1.7303	.0126	4005.5	5694.9	52.894	10.44	14.61	1556.
450.	.37930	1.9381	.0112	4527.4	6423.9	54.612	10.42	14.57	1646.
500.	.42067	2.1455	.0100	5049.0	7152.3	56.146	10.41	14.56	1732.
550.	.46201	2.3525	.0091	5569.9	7880.0	57.533	10.42	14.56	1813.
600.	.50333	2.5594	.0083	6091.6	8608.3	58.799	10.43	14.57	1891.
700.	.58593	2.9728	.0072	7137.6	10067.3	61.049	10.49	14.62	2036.
800.	.66849	3.3858	.0063	8190.8	11533.3	63.006	10.58	14.71	2170.
900.	.75103	3.7987	.0056	9254.7	13009.8	64.743	10.70	14.83	2294.
1000.	.83355	4.2114	.0050	10332.3	14500.0	66.316	10.86	14.99	2411.
1200.	.99857	5.0367	.0042	12543.0	17535.9	69.070	11.24	15.37	2624.
1400.	1.16357	5.8618	.0036	14835.9	20653.8	71.477	11.68	15.81	2816.
1600.	1.32856	6.6867	.0031	17214.8	23857.6	73.593	12.10	16.23	2994.
1800.	1.49358	7.5117	.0028	19681.2	27149.1	75.494	12.51	16.63	3161.
2000.	1.65871	8.3366	.0025	22242.5	30536.1	77.344	12.97	17.11	3316.
2200.	1.82423	9.1615	.0023	24910.9	34032.0	79.682	13.61	17.78	3459.
2400.	1.99073	9.9864	.0021	27739.5	37693.1	82.320	14.56	18.80	3590.
2600.	2.15934	10.8112	.0019	30814.3	41611.0	85.191	16.02	20.39	3709.
2800.	2.33195	11.6361	.0018	34264.5	45924.3	88.185	18.19	22.81	3819.
3000.	2.51137	12.4609	.0017	38263.4	50820.3	91.173	21.24	26.28	3924.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

5.00 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	15.382	79.6358	783.3	.24654	117.4329	.00817	91.17	285.79	.00064	1.26081	2.0050
	16.	79.2264	787.3	.24343	114.2398	.00845	95.52	265.42	.00065	1.25937	1.8493
	17.	78.5408	788.2	.23818	108.1565	.00897	100.86	237.88	.00065	1.25695	1.6680
	18.	77.8155	787.1	.23283	101.9981	.00950	104.95	215.35	.00065	1.25439	1.5345
	19.	77.0622	786.1	.22740	96.1733	.01001	107.77	196.75	.00064	1.25174	1.4359
	20.	76.2761	787.1	.22203	91.0477	.01045	110.42	181.10	.00063	1.24897	1.3490
	21.	75.4646	781.7	.21690	85.2096	.01101	113.42	167.84	.00063	1.24612	1.2738
	22.	74.6146	777.0	.21204	79.8570	.01156	115.66	156.35	.00062	1.24314	1.2145
	23.	73.7364	770.4	.20750	74.5884	.01216	117.28	146.37	.00061	1.24007	1.1694
	24.	72.8222	762.8	.20319	69.4869	.01280	118.35	137.55	.00060	1.23688	1.1348
	25.	71.8716	753.7	.19904	64.5102	.01349	118.95	129.69	.00059	1.23356	1.1087
	26.	70.8805	743.0	.19495	59.6057	.01425	119.08	122.61	.00057	1.23011	1.0906
	27.	69.8496	731.3	.19081	54.8474	.01509	118.84	116.19	.00056	1.22653	1.0786
	28.	68.7720	718.7	.18661	50.2511	.01599	118.27	110.29	.00054	1.22279	1.0717
	29.	67.6477	705.4	.18239	45.8798	.01696	117.41	104.84	.00052	1.21890	1.0684
	30.	66.4752	690.6	.17822	41.6295	.01805	116.30	99.78	.00051	1.21485	1.0697
	31.	65.2503	676.0	.17391	37.6892	.01920	114.51	95.05	.00049	1.21063	1.0776
	32.	63.9697	661.5	.16952	34.0273	.02043	112.55	90.59	.00047	1.20623	1.0877
	33.	62.6315	645.9	.16512	30.5202	.02181	110.43	86.38	.00045	1.20164	1.1019
	34.	61.2349	629.0	.16060	27.1527	.02341	108.22	82.39	.00043	1.19686	1.1208
	36.	58.2355	595.4	.15119	21.2278	.02700	103.41	74.94	.00040	1.18664	1.1648
	38.	54.9544	562.9	.14154	16.3795	.03110	98.22	68.14	.00037	1.17554	1.2145
	40.	51.4071	532.7	.13215	12.5594	.03559	93.45	61.98	.00035	1.16360	1.2573
	42.	47.6583	507.9	.12317	9.7251	.03993	89.06	56.55	.00033	1.15109	1.2877
	44.	43.8420	490.8	.11495	7.7629	.04323	84.77	51.94	.00033	1.13844	1.3002
	46.	40.1370	483.0	.10743	6.4812	.04479	80.84	48.24	.00034	1.12625	1.2908
	48.	36.7078	483.4	.10151	5.7089	.04424	77.38	45.39	.00035	1.11504	1.2545
	50.	33.6647	490.9	.09677	5.2680	.04208	74.53	43.31	.00039	1.10517	1.2004
	52.	31.0368	503.9	.09293	5.0278	.03912	72.32	41.84	.00043	1.09669	1.1404
	56.	26.8763	541.6	.08712	4.8583	.03301	69.61	40.11	.00052	1.08336	1.0301
	60.	23.7978	588.2	.08283	4.8435	.02804	68.64	39.37	.00063	1.07357	.9461
	65.	20.9367	654.7	.07812	4.8841	.02348	69.25	39.24	.00077	1.06453	.8711
	70.	18.7801	728.8	.07368	4.9402	.02019	70.78	39.67	.00092	1.05775	.8248
	75.	17.0856	809.5	.06937	4.9860	.01776	72.04	40.43	.00106	1.05244	.8069
	80.	15.7118	897.8	.06524	5.0342	.01587	74.67	41.39	.00120	1.04815	.7897
	90.	13.5961	1094.5	.05763	5.1010	.01313	83.01	43.63	.00153	1.04157	.7554
	100.	12.0401	1313.4	.05136	5.1426	.01128	91.74	46.07	.00185	1.03675	.7439
	110.	10.8375	1553.3	.04608	5.1649	.00990	100.13	47.41	.00216	1.03304	.7284
	120.	9.8688	1792.9	.04252	5.1798	.00887	109.69	49.78	.00252	1.03005	.7215
	130.	9.0702	2028.6	.03999	5.1886	.00804	118.82	52.19	.00289	1.02760	.7166
	140.	8.3984	2254.0	.03826	5.1932	.00737	127.01	54.61	.00328	1.02554	.7142
	160.	7.3272	2658.1	.03655	5.1949	.00633	140.41	59.39	.00410	1.02225	.7120
	180.	6.5075	2999.5	.03625	5.1912	.00557	150.77	64.07	.00500	1.01975	.7095
	200.	5.8579	3292.8	.03669	5.1850	.00497	159.28	68.64	.00598	1.01776	.7057
	220.	5.3293	3557.0	.03744	5.1778	.00450	166.83	73.10	.00704	1.01615	.7013
	240.	4.8902	3808.5	.03824	5.1703	.00411	173.96	77.45	.00818	1.01481	.6972
	260.	4.5191	4058.5	.03895	5.1628	.00379	180.98	81.70	.00938	1.01368	.6939
	280.	4.2013	4312.0	.03952	5.1556	.00351	188.04	85.86	.01064	1.01272	.6915
	300.	3.9249	4574.3	.03994	5.1512	.00327	195.19	89.93	.01196	1.01188	.6895
	350.	3.3740	5250.3	.04051	5.1348	.00280	213.52	99.76	.01548	1.01020	.6875
	400.	2.9596	5954.2	.04066	5.1212	.00245	232.23	109.16	.01934	1.00895	.6867
	450.	2.6365	6676.8	.04060	5.1097	.00218	250.95	118.20	.02351	1.00797	.6864
	500.	2.3772	7403.8	.04052	5.1001	.00197	269.44	126.92	.02803	1.00718	.6857
	550.	2.1644	8137.3	.04041	5.0919	.00179	287.62	135.37	.03286	1.00654	.6852
	600.	1.9868	8875.6	.04028	5.0849	.00164	305.50	143.57	.03799	1.00600	.6847
	700.	1.7067	10372.9	.03996	5.0736	.00141	340.56	159.36	.04914	1.00515	.6841
	800.	1.4959	11909.3	.03953	5.0649	.00123	375.19	174.46	.06140	1.00451	.6838
	900.	1.3315	13495.8	.03901	5.0580	.00110	409.89	188.99	.07473	1.00402	.6838
	1000.	1.1997	15140.0	.03839	5.0524	.00099	444.95	203.03	.08909	1.00362	.6839
	1200.	1.0014	18602.9	.03701	5.0439	.00083	511.13	229.94	.11955	1.00302	.6914
	1400.	.8594	22292.3	.03558	5.0377	.00071	583.35	255.55	.15461	1.00259	.6924
	1600.	.7527	26131.4	.03431	5.0331	.00062	655.72	280.10	.19329	1.00227	.6931
	1800.	.6695	30115.3	.03318	5.0293	.00055	729.19	303.71	.23572	1.00202	.6928
	2000.	.6029	34402.4	.03196	5.0259	.00050	809.75	326.47	.28256	1.00182	.6899
	2200.	.5482	39280.4	.03046	5.0221	.00045	908.60	344.91	.33568	1.00165	.6748
	2400.	.5023	45261.4	.02848	5.0164	.00042	1045.16	366.31	.39849	1.00151	.6588
	2600.	.4631	53095.1	.02592	5.0067	.00038	1247.57	387.36	.47555	1.00140	.6332
	2800.	.4288	63734.4	.02290	4.9898	.00036	1551.49	408.27	.57106	1.00129	.6002
	3000.	.3982	78243.2	.01970	4.9618	.00034	1996.91	429.34	.68695	1.00120	.5651

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

6.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 15.678	.01248	1.5352	.9665	-305.5	-230.6	5.103	4.92	6.40	1414.
16.	.01252	1.5184	.9702	-303.6	-228.5	5.235	4.98	6.54	1411.
17.	.01262	1.4521	.9773	-297.4	-221.7	5.644	5.17	6.95	1397.
18.	.01273	1.3891	.9784	-291.0	-214.6	6.052	5.33	7.34	1383.
19.	.01285	1.3275	.9746	-284.1	-207.1	6.459	5.48	7.72	1368.
20.	.01297	1.2678	.9665	-277.0	-199.1	6.865	5.61	8.09	1352.
21.	.01310	1.2171	.9551	-269.5	-190.9	7.268	5.72	8.43	1339.
22.	.01324	1.1548	.9421	-261.7	-182.3	7.668	5.83	8.79	1320.
23.	.01339	1.0975	.9270	-253.6	-173.3	8.068	5.92	9.15	1302.
24.	.01355	1.0404	.9107	-245.2	-164.0	8.464	6.00	9.52	1284.
25.	.01371	.9847	.8930	-236.5	-154.3	8.860	6.08	9.89	1265.
26.	.01389	.9301	.8740	-227.5	-144.2	9.256	6.15	10.26	1246.
27.	.01407	.8757	.8536	-218.2	-133.7	9.650	6.21	10.66	1226.
28.	.01427	.8223	.8318	-208.5	-122.9	10.045	6.26	11.06	1205.
29.	.01449	.7702	.8086	-198.5	-111.6	10.440	6.31	11.48	1183.
30.	.01471	.7202	.7842	-188.2	-99.9	10.837	6.35	11.90	1161.
31.	.01496	.6722	.7588	-177.6	-87.8	11.234	6.39	12.33	1139.
32.	.01522	.6260	.7325	-166.6	-75.2	11.633	6.42	12.78	1116.
33.	.01550	.5802	.7055	-155.2	-62.2	12.033	6.45	13.25	1092.
34.	.01580	.5386	.6782	-143.6	-48.7	12.436	6.48	13.73	1068.
36.	.01648	.4609	.6222	-119.2	-20.3	13.249	6.52	14.74	1020.
38.	.01728	.3915	.5651	-93.4	10.3	14.074	6.56	15.81	972.
40.	.01822	.3333	.5082	-66.3	42.9	14.912	6.58	16.86	924.
42.	.01931	.2862	.4536	-38.2	77.7	15.760	6.60	17.86	880.
44.	.02058	.2504	.4027	-9.2	114.3	16.611	6.63	18.70	841.
46.	.02204	.2252	.3568	19.6	151.9	17.446	6.70	19.33	806.
48.	.02366	.2085	.3165	48.9	190.9	18.276	6.75	19.65	779.
50.	.02542	.2003	.2818	77.7	230.2	19.078	6.79	19.60	760.
52.	.02728	.1977	.2523	105.4	269.1	19.842	6.82	19.29	747.
56.	.03116	.2049	.2063	157.5	344.4	21.237	6.88	18.17	736.
60.	.03505	.2211	.1738	204.4	414.7	22.450	6.93	17.00	737.
65.	.03981	.2460	.1456	257.9	496.8	23.764	7.05	15.92	745.
70.	.04442	.2737	.1256	307.9	574.4	24.916	7.24	15.21	758.
75.	.04887	.3015	.1109	356.1	649.3	25.949	7.50	14.81	771.
80.	.05321	.3291	.0994	403.6	722.8	26.898	7.82	14.62	785.
90.	.06156	.3834	.0829	499.5	868.9	28.619	8.57	14.68	810.
100.	.06965	.4362	.0713	599.8	1017.7	30.186	9.40	15.05	836.
110.	.07743	.4861	.0625	707.1	1171.6	31.652	10.27	15.57	859.
120.	.08506	.5350	.0560	819.3	1329.7	33.027	10.97	16.05	885.
130.	.09257	.5828	.0507	936.8	1492.2	34.328	11.53	16.44	912.
140.	.09999	.6296	.0464	1058.1	1658.1	35.556	11.93	16.72	939.
160.	.11460	.7212	.0398	1307.5	1995.1	37.806	12.30	16.92	996.
180.	.12901	.8107	.0349	1558.1	2332.2	39.793	12.26	16.76	1053.
200.	.14328	.8987	.0311	1804.6	2664.3	41.541	12.01	16.43	1109.
220.	.15745	.9856	.0281	2044.3	2989.0	43.089	11.69	16.05	1163.
240.	.17154	1.0718	.0256	2277.1	3306.3	44.470	11.38	15.70	1216.
260.	.18557	1.1573	.0235	2503.8	3617.2	45.714	11.12	15.40	1266.
280.	.19955	1.2423	.0218	2725.5	3922.8	46.847	10.91	15.17	1314.
300.	.21357	1.3282	.0203	2944.2	4225.7	47.891	10.76	14.99	1360.
350.	.24829	1.5381	.0173	3478.1	4967.8	50.178	10.54	14.73	1466.
400.	.28290	1.7469	.0151	4003.8	5701.2	52.138	10.45	14.62	1564.
450.	.31744	1.9548	.0134	4526.0	6430.7	53.857	10.42	14.58	1654.
500.	.35194	2.1623	.0120	5047.8	7159.5	55.392	10.41	14.56	1739.
550.	.38640	2.3695	.0109	5569.0	7887.4	56.780	10.42	14.56	1820.
600.	.42085	2.5765	.0100	6090.8	8615.9	58.046	10.43	14.57	1897.
700.	.48969	2.9900	.0086	7137.0	10075.2	60.297	10.49	14.62	2042.
800.	.55850	3.4031	.0075	8190.4	11541.4	62.253	10.58	14.71	2175.
900.	.62729	3.8160	.0067	9254.4	13018.1	63.991	10.70	14.83	2300.
1000.	.69606	4.2287	.0060	10332.0	14508.4	65.564	10.86	14.99	2416.
1200.	.83359	5.0540	.0050	12542.9	17544.4	68.318	11.24	15.37	2628.
1400.	.97109	5.8791	.0043	14835.8	20662.4	70.725	11.68	15.81	2821.
1600.	1.10859	6.7041	.0038	17214.7	23866.2	72.841	12.10	16.22	2998.
1800.	1.24610	7.5290	.0033	19680.8	27157.4	74.741	12.50	16.53	3165.
2000.	1.38370	8.3539	.0030	22240.3	30542.5	76.591	12.96	17.10	3320.
2200.	1.52160	9.1788	.0027	24903.3	34032.9	78.926	13.57	17.73	3463.
2400.	1.66024	10.0037	.0025	27718.2	37679.6	81.558	14.47	18.69	3595.
2600.	1.80049	10.8286	.0023	30762.9	41565.9	84.417	15.82	20.17	3715.
2800.	1.94379	11.6534	.0021	34155.0	45817.7	87.388	17.82	22.40	3826.
3000.	2.09227	12.4783	.0020	38052.4	50606.0	90.339	20.64	25.59	3932.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

6.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 15.678	80.1084	815.0	.24531	122.9816	.00786	94.38	291.98	.00066	1.26248	1.9813
16.	79.9026	817.4	.24368	121.3254	.00800	96.62	280.92	.00067	1.26176	1.9004
17.	79.2468	818.3	.23857	115.0744	.00849	102.22	251.31	.00067	1.25944	1.7087
18.	78.5592	819.2	.23347	109.1289	.00897	106.54	227.24	.00066	1.25701	1.5666
19.	77.8398	819.0	.22846	103.3346	.00943	109.56	207.34	.00066	1.25447	1.4619
20.	77.0922	818.0	.22351	97.7383	.00989	112.41	190.68	.00065	1.25184	1.3721
21.	76.3144	819.4	.21868	92.8849	.01028	115.60	176.53	.00065	1.24911	1.2867
22.	75.5170	813.9	.21407	87.2047	.01080	118.06	164.45	.00064	1.24631	1.2247
23.	74.6827	809.0	.20964	81.9628	.01131	119.87	153.88	.00063	1.24338	1.1746
24.	73.8252	802.5	.20543	76.8050	.01186	121.15	144.65	.00062	1.24038	1.1361
25.	72.9345	795.0	.20141	71.8211	.01243	121.95	136.45	.00061	1.23727	1.1061
26.	72.0101	786.6	.19746	66.9741	.01305	122.28	129.09	.00060	1.23404	1.0836
27.	71.0541	776.9	.19351	62.2238	.01372	122.26	122.45	.00058	1.23072	1.0675
28.	70.0607	766.3	.18952	57.6127	.01444	121.91	116.40	.00057	1.22726	1.0564
29.	69.0310	754.8	.18553	53.1673	.01521	121.28	110.84	.00055	1.22369	1.0492
30.	67.9619	742.7	.18162	48.9441	.01602	120.41	105.70	.00054	1.21999	1.0447
31.	66.8519	730.4	.17759	44.9390	.01688	118.86	100.92	.00052	1.21615	1.0470
32.	65.7014	717.5	.17353	41.1263	.01781	117.16	96.46	.00050	1.21218	1.0521
33.	64.5097	703.3	.16947	37.4312	.01885	115.32	92.27	.00049	1.20808	1.0605
34.	63.2733	690.0	.16545	34.0776	.01990	113.39	88.31	.00047	1.20384	1.0694
36.	60.6643	662.4	.15723	27.9606	.02225	109.25	81.02	.00044	1.19491	1.0931
38.	57.8698	634.0	.14889	22.6546	.02494	104.80	74.43	.00041	1.18540	1.1231
40.	54.8979	607.1	.14075	18.2964	.02778	100.19	68.49	.00039	1.17534	1.1527
42.	51.7818	583.5	.13275	14.8206	.03061	95.96	63.18	.00037	1.16486	1.1757
44.	48.5797	565.0	.12507	12.1657	.03310	92.17	58.53	.00037	1.15415	1.1877
46.	45.3752	553.4	.11743	10.2169	.03492	88.57	54.57	.00036	1.14351	1.1908
48.	42.2687	547.3	.11097	8.8143	.03591	85.29	51.32	.00037	1.13325	1.1825
50.	39.3388	548.0	.10549	7.8782	.03577	82.37	48.71	.00038	1.12363	1.1591
52.	36.6521	553.9	.10085	7.2446	.03482	79.91	46.70	.00041	1.11486	1.1272
56.	32.0953	579.2	.09346	6.5765	.03137	76.36	44.08	.00047	1.10010	1.0486
60.	28.5293	616.9	.08797	6.3073	.02756	74.52	42.71	.00055	1.08864	.9744
65.	25.1194	675.9	.08223	6.1803	.02355	74.27	42.01	.00067	1.07776	.9303
70.	22.5144	745.7	.07708	6.1615	.02039	75.12	41.98	.00079	1.06951	.8497
75.	20.4609	823.7	.07224	6.1681	.01797	75.78	42.37	.00090	1.06303	.8279
80.	18.7948	909.6	.06768	6.1862	.01608	78.02	43.05	.00102	1.05779	.8068
90.	16.2435	1103.5	.05951	6.2279	.01331	85.91	44.89	.00130	1.04981	.7673
100.	14.3578	1322.2	.05282	6.2622	.01138	94.29	47.07	.00157	1.04394	.7513
110.	12.9156	1564.0	.04713	6.2787	.00996	102.37	48.33	.00183	1.03946	.7352
120.	11.7562	1804.3	.04339	6.2901	.00890	111.60	50.53	.00213	1.03588	.7268
130.	10.8023	2040.9	.04074	6.2955	.00806	120.46	52.82	.00244	1.03293	.7210
140.	10.0012	2267.5	.03893	6.2970	.00737	128.42	55.14	.00276	1.03046	.7179
160.	8.7257	2674.1	.03709	6.2927	.00633	141.49	59.79	.00345	1.02654	.7149
180.	7.7511	3017.7	.03673	6.2834	.00555	151.61	64.39	.00420	1.02355	.7119
200.	6.9792	3312.8	.03711	6.2720	.00496	159.96	68.91	.00502	1.02119	.7077
220.	6.3512	3578.4	.03782	6.2600	.00449	167.39	73.32	.00591	1.01927	.7030
240.	5.8296	3831.0	.03859	6.2480	.00410	174.43	77.64	.00686	1.01768	.6987
260.	5.3888	4081.9	.03928	6.2364	.00377	181.38	81.87	.00787	1.01633	.6952
280.	5.0112	4336.2	.03983	6.2255	.00350	188.38	86.01	.00892	1.01518	.6926
300.	4.6823	4600.2	.04023	6.2192	.00326	195.49	90.06	.01003	1.01418	.6905
350.	4.0275	5277.2	.04075	6.1949	.00279	213.75	99.86	.01297	1.01219	.6882
400.	3.5348	5981.9	.04087	6.1748	.00244	232.41	109.24	.01619	1.01069	.6872
450.	3.1502	6705.2	.04079	6.1581	.00217	251.10	118.27	.01968	1.00952	.6868
500.	2.8414	7432.6	.04069	6.1441	.00196	269.57	126.98	.02345	1.00859	.6860
550.	2.5880	8166.5	.04056	6.1323	.00178	287.73	135.42	.02748	1.00782	.6854
600.	2.3762	8905.1	.04041	6.1222	.00164	305.60	143.62	.03177	1.00718	.6849
700.	2.0421	10402.9	.04007	6.1058	.00141	340.64	159.40	.04107	1.00617	.6842
800.	1.7905	11939.7	.03963	6.0932	.00123	375.26	174.49	.05130	1.00541	.6839
900.	1.5942	13526.6	.03909	6.0833	.00110	409.95	189.01	.06242	1.00481	.6838
1000.	1.4367	15171.3	.03847	6.0752	.00099	445.00	203.06	.07440	1.00434	.6839
1200.	1.1996	18635.1	.03707	6.0630	.00082	511.13	229.96	.09979	1.00362	.6915
1400.	1.0298	22325.5	.03563	6.0541	.00071	583.34	255.57	.12903	1.00311	.6924
1600.	.9020	26164.3	.03436	6.0474	.00062	655.67	280.11	.15128	1.00272	.6931
1800.	.8025	30142.9	.03322	6.0421	.00055	728.90	303.72	.19663	1.00242	.6929
2000.	.7227	34407.7	.03203	6.0374	.00050	808.56	326.47	.23558	1.00218	.6903
2200.	.6572	39220.6	.03056	6.0324	.00045	904.90	344.91	.27955	1.00198	.6758
2400.	.6023	45048.6	.02869	6.0255	.00041	1035.61	366.30	.33117	1.00182	.6611
2600.	.5554	52576.1	.02626	6.0142	.00038	1226.43	387.32	.39406	1.00167	.6371
2800.	.5145	62675.1	.02337	5.9952	.00036	1510.00	408.18	.47169	1.00155	.6055
3000.	.4780	76323.3	.02028	5.9640	.00034	1923.06	429.15	.56595	1.00144	.5712

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

7.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 15.968	.01241	1.5924	.9744	-304.7	-217.8	5.125	4.95	6.42	1437.
16.	.01242	1.5910	.9748	-304.5	-217.6	5.137	4.96	6.43	1437.
17.	.01251	1.5282	.9838	-298.5	-210.9	5.540	5.15	6.84	1424.
18.	.01262	1.4642	.9869	-292.2	-203.9	5.942	5.32	7.22	1410.
19.	.01273	1.4027	.9850	-285.6	-196.5	6.342	5.47	7.60	1396.
20.	.01284	1.3450	.9792	-278.6	-188.7	6.740	5.60	7.95	1382.
21.	.01297	1.2874	.9699	-271.4	-180.6	7.137	5.72	8.30	1367.
22.	.01310	1.2395	.9580	-263.8	-172.1	7.531	5.82	8.62	1354.
23.	.01323	1.1794	.9449	-256.0	-163.3	7.921	5.91	8.96	1337.
24.	.01338	1.1240	.9297	-247.8	-154.2	8.310	6.00	9.30	1320.
25.	.01353	1.0683	.9134	-239.4	-144.7	8.697	6.08	9.65	1303.
26.	.01369	1.0143	.8957	-230.7	-134.9	9.082	6.15	10.00	1285.
27.	.01386	.9618	.8768	-221.8	-124.7	9.466	6.21	10.36	1267.
28.	.01404	.9094	.8568	-212.5	-114.2	9.850	6.27	10.72	1247.
29.	.01423	.8584	.8355	-202.9	-103.3	10.232	6.32	11.10	1228.
30.	.01444	.8083	.8129	-193.1	-92.0	10.615	6.36	11.47	1207.
31.	.01465	.7604	.7894	-182.9	-80.3	10.997	6.40	11.86	1187.
32.	.01488	.7147	.7650	-172.5	-68.3	11.379	6.44	12.24	1166.
33.	.01513	.6708	.7400	-161.8	-55.9	11.762	6.47	12.63	1144.
34.	.01539	.6287	.7144	-150.7	-43.0	12.145	6.50	13.03	1123.
36.	.01596	.5506	.6628	-127.9	-16.1	12.914	6.54	13.86	1080.
38.	.01662	.4800	.6104	-103.9	12.4	13.686	6.58	14.72	1037.
40.	.01737	.4194	.5579	-78.9	42.7	14.463	6.59	15.55	995.
42.	.01823	.3681	.5067	-53.0	74.6	15.241	6.61	16.34	954.
44.	.01920	.3261	.4581	-26.4	108.1	16.019	6.63	17.07	916.
46.	.02030	.2935	.4130	.2	142.3	16.779	6.59	17.71	881.
48.	.02152	.2706	.3721	27.5	178.2	17.542	6.74	18.11	853.
50.	.02285	.2544	.3357	54.8	214.7	18.287	6.79	18.34	829.
52.	.02427	.2442	.3036	81.5	251.4	19.008	6.83	18.39	811.
56.	.02731	.2398	.2516	133.3	324.5	20.362	6.90	17.92	789.
60.	.03048	.2480	.2127	181.3	394.6	21.572	6.96	17.12	781.
65.	.03445	.2667	.1776	236.6	477.8	22.904	7.08	16.20	781.
70.	.03836	.2901	.1526	288.5	557.0	24.078	7.27	15.54	788.
75.	.04218	.3157	.1341	338.3	633.6	25.135	7.53	15.13	797.
80.	.04592	.3420	.1198	387.2	708.6	26.104	7.84	14.92	807.
90.	.05315	.3949	.0992	485.4	857.5	27.857	8.59	14.93	828.
100.	.06013	.4469	.0850	587.4	1008.3	29.446	9.42	15.27	851.
110.	.06689	.4971	.0746	696.4	1164.6	30.934	10.30	15.80	873.
120.	.07350	.5464	.0662	809.8	1324.3	32.324	11.00	16.20	897.
130.	.07999	.5945	.0599	928.1	1488.1	33.635	11.55	16.57	924.
140.	.08640	.6418	.0547	1050.3	1655.1	34.872	11.95	16.83	951.
160.	.09901	.7340	.0468	1300.8	1993.9	37.134	12.31	17.00	1006.
180.	.11143	.8241	.0410	1552.4	2332.4	39.128	12.27	16.82	1063.
200.	.12371	.9126	.0365	1799.6	2665.5	40.882	12.02	16.48	1119.
220.	.13590	1.0000	.0329	2039.9	2991.2	42.435	11.70	16.09	1173.
240.	.14801	1.0865	.0300	2273.2	3309.2	43.819	11.39	15.73	1225.
260.	.16007	1.1724	.0275	2500.3	3620.7	45.066	11.13	15.43	1275.
280.	.17208	1.2577	.0255	2722.3	3926.9	46.200	10.92	15.20	1323.
300.	.18414	1.3443	.0237	2941.5	4230.5	47.247	10.77	15.01	1369.
350.	.21394	1.5545	.0202	3476.0	4973.6	49.537	10.54	14.75	1475.
400.	.24363	1.7635	.0176	4002.2	5707.6	51.498	10.45	14.63	1571.
450.	.27326	1.9716	.0156	4524.7	6437.5	53.219	10.42	14.59	1661.
500.	.30284	2.1793	.0141	5046.8	7166.6	54.754	10.41	14.57	1746.
550.	.33239	2.3865	.0128	5568.0	7894.8	56.142	10.42	14.57	1827.
600.	.36192	2.5936	.0117	6090.0	8623.5	57.409	10.43	14.58	1903.
700.	.42095	3.0071	.0100	7136.5	10083.1	59.660	10.49	14.62	2048.
800.	.47993	3.4203	.0088	8190.0	11549.5	61.617	10.58	14.71	2181.
900.	.53890	3.8332	.0078	9254.0	13026.4	63.355	10.70	14.83	2305.
1000.	.59785	4.2460	.0070	10331.8	14516.8	64.928	10.86	14.99	2421.
1200.	.71574	5.0713	.0058	12542.7	17552.9	67.682	11.24	15.37	2633.
1400.	.83360	5.8964	.0050	14835.8	20671.0	70.089	11.68	15.81	2825.
1600.	.95146	6.7213	.0044	17214.6	23874.8	72.205	12.10	16.22	3002.
1800.	1.06933	7.5463	.0039	19680.4	27165.7	74.105	12.50	16.63	3168.
2000.	1.18726	8.3712	.0035	22238.7	30549.5	75.954	12.95	17.09	3323.
2200.	1.30543	9.1961	.0032	24897.5	34035.5	78.287	13.54	17.70	3467.
2400.	1.42420	10.0209	.0029	27701.6	37671.0	80.915	14.39	18.51	3600.
2600.	1.54424	10.8458	.0027	30723.0	41532.7	83.763	15.67	20.00	3720.
2800.	1.66670	11.6706	.0025	34069.9	45736.9	86.716	17.54	22.08	3832.
3000.	1.79328	12.4955	.0023	37888.4	50441.4	89.639	20.17	25.06	3938.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

7.00 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	15.968	80.5666	844.9	.24430	128.2933	.00760	97.46	298.16	.00068	1.26411	1.9633
	16.	80.5475	845.3	.24413	128.1504	.00761	97.68	297.03	.00068	1.26404	1.9553
	17.	79.9143	848.5	.23909	122.1251	.00806	103.51	265.12	.00068	1.26180	1.7507
	18.	79.2588	849.6	.23410	116.0489	.00850	108.05	239.40	.00068	1.25948	1.6008
	19.	78.5724	850.1	.22924	110.2150	.00894	111.26	218.17	.00067	1.25706	1.4838
	20.	77.8601	850.4	.22459	104.7199	.00935	114.31	200.45	.00066	1.25455	1.3945
	21.	77.1160	849.3	.22001	99.2809	.00977	117.69	185.39	.00066	1.25193	1.3069
	22.	76.3500	851.1	.21557	94.6381	.01012	120.32	172.53	.00066	1.24923	1.2354
	23.	75.5655	845.5	.21141	89.1232	.01060	122.33	161.46	.00065	1.24648	1.1831
	24.	74.7481	840.7	.20730	84.0149	.01107	123.78	151.72	.00064	1.24361	1.1404
	25.	73.9086	834.2	.20338	78.9602	.01157	124.76	143.14	.00063	1.24067	1.1072
	26.	73.0392	827.1	.19956	74.0861	.01209	125.27	135.47	.00062	1.23764	1.0814
	27.	72.1426	819.5	.19575	69.3888	.01264	125.42	128.58	.00060	1.23451	1.0617
	28.	71.2161	810.7	.19194	64.7641	.01323	125.26	122.32	.00059	1.23128	1.0473
	29.	70.2596	801.1	.18816	60.3127	.01385	124.82	116.61	.00058	1.22795	1.0366
	30.	69.2709	790.3	.18445	55.9936	.01452	124.14	111.36	.00056	1.22452	1.0292
	31.	68.2493	779.5	.18064	51.8953	.01521	122.79	106.49	.00055	1.22098	1.0283
	32.	67.1955	768.5	.17681	48.0249	.01593	121.28	101.97	.00053	1.21734	1.0293
	33.	66.1094	757.1	.17302	44.3448	.01669	119.65	97.75	.00052	1.21359	1.0321
	34.	64.9888	745.3	.16922	40.8590	.01749	117.94	93.78	.00050	1.20973	1.0363
	36.	62.6474	721.4	.16171	34.4949	.01921	114.25	86.51	.00047	1.20169	1.0496
	38.	60.1709	696.7	.15423	28.8802	.02113	110.31	80.00	.00045	1.19323	1.0679
	40.	57.5659	673.0	.14699	24.1448	.02311	106.21	74.14	.00043	1.18437	1.0856
	42.	54.8551	651.4	.13975	20.1923	.02509	102.06	68.90	.00041	1.17520	1.1033
	44.	52.0711	633.0	.13262	16.9828	.02697	98.31	64.24	.00040	1.16583	1.1157
	46.	49.2584	620.1	.12523	14.4590	.02856	95.01	60.18	.00039	1.15642	1.1217
	48.	46.4718	612.2	.11872	12.5758	.02958	91.89	56.70	.00039	1.14714	1.1176
	50.	43.7729	608.7	.11296	11.1370	.03014	89.06	53.79	.00040	1.13821	1.1080
	52.	41.2091	609.5	.10789	10.0635	.03017	86.56	51.41	.00041	1.12976	1.0924
	56.	36.6163	625.5	.09960	8.7809	.02865	82.62	48.02	.00045	1.11475	1.0418
	60.	32.8099	655.1	.09319	8.1382	.02613	80.18	46.02	.00051	1.10241	.9826
	65.	29.0283	706.2	.08645	7.7421	.02294	79.23	44.77	.00061	1.09024	.9156
	70.	26.0692	770.1	.08055	7.5635	.02018	79.48	44.34	.00071	1.08079	.8671
	75.	23.7060	844.3	.07516	7.4838	.01792	79.59	44.42	.00080	1.07328	.8445
	80.	21.7779	927.7	.07016	7.4491	.01609	81.44	44.82	.00090	1.06718	.8214
	90.	18.8139	1118.3	.06137	7.4304	.01336	88.84	46.26	.00114	1.05785	.7776
	100.	16.6298	1334.6	.05429	7.4325	.01144	96.88	48.17	.00137	1.05102	.7591
	110.	14.9503	1575.2	.04842	7.4318	.01003	104.74	49.34	.00160	1.04578	.7445
	120.	13.6060	1818.5	.04426	7.4343	.00891	113.62	51.35	.00186	1.04160	.7321
	130.	12.5013	2055.9	.04149	7.4327	.00806	122.20	53.50	.00212	1.03818	.7254
	140.	11.5745	2283.4	.03958	7.4281	.00737	129.92	55.72	.00240	1.03531	.7216
	160.	10.1003	2691.9	.03763	7.4137	.00631	142.64	60.24	.00299	1.03077	.7178
	180.	8.9746	3037.3	.03719	7.3960	.00554	152.51	64.75	.00364	1.02730	.7142
	200.	8.0834	3333.9	.03753	7.3773	.00494	160.68	69.20	.00434	1.02457	.7097
	220.	7.3585	3600.6	.03821	7.3588	.00447	167.98	73.57	.00511	1.02235	.7047
	240.	6.7563	3854.2	.03895	7.3410	.00408	174.92	77.85	.00592	1.02051	.7002
	260.	6.2474	4105.8	.03961	7.3243	.00376	181.80	82.05	.00679	1.01895	.6965
	280.	5.8112	4360.8	.04013	7.3087	.00348	188.75	86.17	.00769	1.01762	.6938
	300.	5.4307	4626.5	.04051	7.3002	.00324	195.81	90.20	.00865	1.01646	.6915
	350.	4.6743	5304.5	.04100	7.2663	.00278	213.99	99.97	.01118	1.01415	.6889
	400.	4.1046	6009.9	.04108	7.2384	.00243	232.60	109.33	.01394	1.01242	.6877
	450.	3.6596	6733.7	.04098	7.2154	.00217	251.25	118.34	.01694	1.01107	.6872
	500.	3.3021	7461.6	.04086	7.1961	.00195	269.70	127.04	.02018	1.00998	.6863
	550.	3.0085	8195.7	.04071	7.1799	.00178	287.85	135.48	.02364	1.00909	.6856
	600.	2.7630	8934.7	.04055	7.1661	.00163	305.70	143.67	.02732	1.00835	.6851
	700.	2.3756	10432.9	.04019	7.1437	.00140	340.72	159.44	.03531	1.00718	.6843
	800.	2.0836	11970.1	.03974	7.1266	.00123	375.32	174.53	.04409	1.00629	.6840
	900.	1.8556	13557.4	.03918	7.1130	.00109	410.01	189.04	.05363	1.00560	.6839
	1000.	1.6726	15202.5	.03854	7.1020	.00099	445.06	203.08	.06390	1.00505	.6840
	1200.	1.3972	18667.3	.03714	7.0854	.00082	511.13	229.97	.08568	1.00422	.6916
	1400.	1.1996	22358.6	.03569	7.0733	.00071	583.34	255.58	.11076	1.00362	.6925
	1600.	1.0510	26197.5	.03440	7.0643	.00062	655.63	280.12	.13841	1.00317	.6932
	1800.	.9352	30172.1	.03327	7.0570	.00055	728.67	303.73	.16871	1.00282	.6930
	2000.	.8423	34419.8	.03209	7.0508	.00050	807.64	326.48	.20205	1.00254	.6907
	2200.	.7660	39182.2	.03068	7.0445	.00045	902.02	344.90	.23954	1.00231	.6767
	2400.	.7022	44891.5	.02886	7.0362	.00041	1028.19	366.29	.28331	1.00212	.6629
	2600.	.6476	52181.2	.02653	7.0234	.00038	1210.00	387.29	.33631	1.00195	.6402
	2800.	.6000	61860.1	.02375	7.0022	.00036	1477.71	408.11	.40148	1.00181	.6099
	3000.	.5576	74837.9	.02075	6.9679	.00033	1865.56	429.01	.48061	1.00168	.5763

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

8.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 16.253	.01234	1.6420	1.010	-303.9	-205.1	5.142	4.99	6.53	1465.
17.	.01241	1.6009	.9901	-299.4	-200.1	5.442	5.13	6.73	1450.
18.	.01251	1.5400	.9949	-293.3	-193.2	5.838	5.30	7.11	1437.
19.	.01262	1.4780	.9947	-286.8	-185.9	6.232	5.46	7.48	1424.
20.	.01273	1.4176	.9904	-280.1	-178.3	6.624	5.59	7.83	1409.
21.	.01284	1.3626	.9829	-273.0	-170.3	7.014	5.71	8.16	1396.
22.	.01296	1.3074	.9726	-265.7	-161.9	7.402	5.82	8.49	1382.
23.	.01309	1.2612	.9603	-258.0	-153.3	7.786	5.91	8.79	1370.
24.	.01323	1.2048	.9469	-250.1	-144.3	8.168	6.00	9.12	1354.
25.	.01337	1.1497	.9317	-242.0	-135.0	8.547	6.07	9.45	1337.
26.	.01352	1.0957	.9153	-233.6	-125.4	8.924	6.14	9.78	1320.
27.	.01367	1.0434	.8978	-224.9	-115.5	9.299	6.21	10.11	1303.
28.	.01384	.9928	.8791	-215.9	-105.2	9.672	6.27	10.44	1286.
29.	.01401	.9423	.8593	-206.7	-94.6	10.045	6.33	10.79	1268.
30.	.01420	.8935	.8385	-197.2	-83.7	10.416	6.37	11.13	1249.
31.	.01439	.8453	.8166	-187.5	-72.4	10.786	6.41	11.48	1230.
32.	.01460	.7993	.7939	-177.5	-60.7	11.156	6.45	11.83	1210.
33.	.01481	.7555	.7704	-167.2	-48.7	11.525	6.48	12.17	1191.
34.	.01504	.7134	.7465	-156.7	-36.4	11.893	6.51	12.52	1171.
36.	.01554	.6345	.6978	-135.0	-10.7	12.628	6.56	13.24	1131.
38.	.01611	.5644	.6489	-112.3	16.5	13.363	6.60	13.95	1092.
40.	.01674	.5024	.5998	-88.8	45.1	14.097	6.62	14.64	1054.
42.	.01745	.4474	.5516	-64.5	75.1	14.828	6.63	15.33	1017.
44.	.01824	.4026	.5050	-39.6	106.4	15.555	6.65	15.93	982.
46.	.01912	.3647	.4611	-14.7	138.3	16.263	6.71	16.51	947.
48.	.02009	.3360	.4206	11.1	171.7	16.976	6.76	16.95	918.
50.	.02114	.3135	.3835	36.9	206.0	17.675	6.80	17.28	893.
52.	.02227	.2983	.3503	62.6	240.7	18.356	6.84	17.45	872.
56.	.02471	.2824	.2943	113.2	310.9	19.655	6.92	17.41	843.
60.	.02732	.2819	.2508	161.2	379.8	20.844	6.98	16.98	828.
65.	.03068	.2941	.2100	217.5	462.9	22.176	7.11	16.28	821.
70.	.03403	.3128	.1802	270.6	542.8	23.360	7.30	15.71	821.
75.	.03734	.3348	.1580	321.7	620.3	24.430	7.55	15.35	825.
80.	.04059	.3590	.1408	371.7	696.5	25.413	7.87	15.15	831.
90.	.04694	.4096	.1160	472.0	847.5	27.191	8.62	15.14	848.
100.	.05309	.4605	.0991	575.5	1000.2	28.800	9.44	15.44	868.
110.	.05908	.5107	.0866	685.8	1158.5	30.307	10.32	15.96	889.
120.	.06494	.5604	.0771	800.5	1320.1	31.714	11.02	16.39	913.
130.	.07059	.6072	.0692	919.8	1484.6	33.030	11.57	16.59	936.
140.	.07623	.6547	.0632	1042.7	1652.6	34.275	11.97	16.92	962.
160.	.08733	.7475	.0539	1294.4	1993.0	36.548	12.33	17.07	1017.
180.	.09825	.8380	.0471	1546.9	2332.9	38.550	12.29	16.88	1073.
200.	.10904	.9270	.0419	1794.7	2667.1	40.310	12.03	16.53	1128.
220.	.11974	1.0148	.0377	2035.6	2993.5	41.866	11.71	16.13	1182.
240.	.13037	1.1016	.0343	2269.4	3312.3	43.253	11.40	15.76	1234.
260.	.14095	1.1877	.0315	2496.9	3624.4	44.503	11.13	15.46	1284.
280.	.15148	1.2733	.0292	2719.3	3931.1	45.639	10.93	15.22	1332.
300.	.16207	1.3605	.0271	2938.9	4235.5	46.688	10.77	15.03	1378.
350.	.18818	1.5711	.0231	3474.0	4979.4	48.980	10.55	14.76	1483.
400.	.21418	1.7803	.0202	4000.5	5714.0	50.944	10.45	14.64	1579.
450.	.24012	1.9885	.0179	4523.4	6444.4	52.665	10.43	14.60	1668.
500.	.26602	2.1963	.0161	5045.7	7173.8	54.201	10.42	14.58	1753.
550.	.29188	2.4036	.0146	5567.2	7902.2	55.590	10.42	14.57	1833.
600.	.31773	2.6107	.0134	6089.3	8631.2	56.857	10.44	14.58	1910.
700.	.36939	3.0243	.0114	7136.0	10091.0	59.108	10.49	14.63	2054.
800.	.42101	3.4375	.0100	8189.6	11557.7	61.065	10.58	14.71	2186.
900.	.47261	3.8504	.0089	9253.8	13034.6	62.803	10.70	14.83	2310.
1000.	.52419	4.2632	.0080	10331.6	14525.1	64.377	10.86	14.99	2426.
1200.	.62735	5.0885	.0067	12542.6	17561.4	67.131	11.25	15.37	2637.
1400.	.73048	5.9135	.0057	14835.7	20679.6	69.538	11.68	15.81	2829.
1600.	.83361	6.7385	.0050	17214.6	23883.4	71.655	12.10	16.22	3006.
1800.	.93674	7.5634	.0044	19680.1	27174.1	73.554	12.50	16.62	3172.
2000.	1.03993	8.3883	.0040	22237.3	30556.8	75.402	12.94	17.08	3327.
2200.	1.14331	9.2132	.0036	24892.8	34039.3	77.734	13.51	17.67	3471.
2400.	1.24718	10.0380	.0033	27688.4	37665.8	80.358	14.33	18.54	3604.
2600.	1.35210	10.8629	.0031	30690.9	41507.6	83.198	15.54	19.86	3725.
2800.	1.45899	11.6877	.0029	34001.4	45673.4	86.137	17.31	21.83	3838.
3000.	1.56927	12.5126	.0027	37756.2	50310.4	89.037	19.79	24.63	3944.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

8.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 16.253	81.0262	860.5	.24956	133.0474	.00759	100.44	304.73	.00068	1.26573	1.9811
17.	80.5578	876.8	.23972	128.9649	.00768	104.76	279.55	.00070	1.26407	1.7963
18.	79.9223	879.9	.23480	123.0814	.00808	109.49	251.89	.00069	1.26183	1.6363
19.	79.2669	880.9	.23004	117.1587	.00849	112.90	229.28	.00069	1.25951	1.5190
20.	78.5812	880.8	.22547	111.3942	.00889	116.11	210.37	.00068	1.25709	1.4188
21.	77.8729	881.4	.22110	106.1125	.00926	119.69	194.42	.00068	1.25459	1.3262
22.	77.1386	880.4	.21681	100.8483	.00964	122.49	180.78	.00067	1.25201	1.2531
23.	76.3826	882.0	.21271	96.3300	.00997	124.65	169.02	.00067	1.24935	1.1922
24.	75.6049	877.4	.20886	91.0901	.01040	126.26	158.77	.00066	1.24662	1.1470
25.	74.8090	872.1	.20506	86.0104	.01083	127.40	149.79	.00065	1.24383	1.1107
26.	73.9871	865.9	.20134	81.0675	.01129	128.07	141.79	.00064	1.24095	1.0823
27.	73.1403	859.3	.19765	76.3177	.01176	128.38	134.61	.00063	1.23799	1.0599
28.	72.2675	852.4	.19397	71.7474	.01225	128.38	128.13	.00061	1.23494	1.0424
29.	71.3703	844.2	.19035	67.2527	.01278	128.11	122.23	.00060	1.23182	1.0292
30.	70.4457	835.3	.18684	62.9424	.01332	127.59	116.83	.00059	1.22860	1.0189
31.	69.4946	825.6	.18323	58.7436	.01390	126.39	111.85	.00057	1.22530	1.0156
32.	68.5164	815.8	.17958	54.7641	.01450	125.04	107.23	.00056	1.22191	1.0142
33.	67.5114	805.9	.17598	51.0066	.01510	123.57	102.94	.00054	1.21843	1.0140
34.	66.4798	795.6	.17238	47.4290	.01574	122.03	98.93	.00053	1.21487	1.0152
36.	64.3373	774.4	.16524	40.8199	.01709	118.70	91.62	.00050	1.20749	1.0217
38.	62.0887	753.6	.15835	35.0456	.01852	115.12	85.10	.00048	1.19978	1.0315
40.	59.7429	732.7	.15174	30.0121	.01999	111.40	79.26	.00046	1.19177	1.0418
42.	57.3140	712.5	.14512	25.6429	.02151	107.61	74.03	.00044	1.18352	1.0543
44.	54.8247	696.1	.13848	22.0737	.02288	103.88	69.35	.00043	1.17510	1.0632
46.	52.3052	683.1	.13138	19.0754	.02418	100.54	65.22	.00042	1.16662	1.0714
48.	49.7865	674.2	.12502	16.7280	.02514	97.60	61.61	.00042	1.15818	1.0701
50.	47.3102	668.3	.11920	14.8314	.02586	94.88	58.51	.00042	1.14993	1.0658
52.	44.9111	667.3	.11397	13.3977	.02614	92.38	55.88	.00042	1.14197	1.0552
56.	40.4657	676.0	.10512	11.4269	.02576	88.30	51.91	.00045	1.12732	1.0237
60.	36.5979	698.5	.09812	10.3163	.02431	85.51	49.34	.00050	1.11469	.9797
65.	32.5995	743.2	.09062	9.5875	.02190	84.01	47.52	.00057	1.10173	.9267
70.	29.3897	801.5	.08403	9.1934	.01960	83.75	46.69	.00065	1.09140	.8759
75.	26.7843	871.1	.07810	8.9679	.01762	83.41	46.48	.00073	1.08307	.8550
80.	24.6339	951.3	.07266	8.8430	.01592	84.88	46.64	.00082	1.07622	.8322
90.	21.3028	1138.0	.06323	8.7248	.01330	91.80	47.70	.00102	1.06568	.7865
100.	18.8344	1352.2	.05572	8.6726	.01142	99.49	49.33	.00123	1.05792	.7658
110.	16.9254	1592.7	.04960	8.6443	.01002	107.20	50.43	.00143	1.05194	.7507
120.	15.3987	1834.1	.04545	8.6301	.00893	115.72	52.24	.00165	1.04718	.7397
130.	14.1658	2072.8	.04225	8.6019	.00805	124.01	54.24	.00189	1.04334	.7298
140.	13.1174	2301.3	.04023	8.5880	.00735	131.50	56.35	.00213	1.04009	.7253
160.	11.4504	2711.4	.03817	8.5589	.00630	143.84	60.71	.00265	1.03493	.7206
180.	10.1779	3058.2	.03766	8.5295	.00552	153.45	65.13	.00321	1.03101	.7166
200.	9.1706	3355.9	.03795	8.5012	.00492	161.43	69.51	.00383	1.02791	.7117
220.	8.3512	3623.6	.03859	8.4745	.00445	168.59	73.83	.00451	1.02539	.7064
240.	7.6703	3878.0	.03930	8.4496	.00407	175.44	78.08	.00522	1.02330	.7016
260.	7.0948	4130.3	.03993	8.4266	.00374	182.24	82.25	.00598	1.02154	.6978
280.	6.6015	4385.8	.04044	8.4053	.00347	189.12	86.34	.00678	1.02003	.6949
300.	6.1701	4653.2	.04080	8.3944	.00323	196.14	90.35	.00761	1.01872	.6925
350.	5.3141	5332.0	.04124	8.3490	.00277	214.24	100.09	.00983	1.01610	.6896
400.	4.6690	6038.0	.04129	8.3119	.00242	232.79	109.43	.01226	1.01414	.6882
450.	4.1646	6762.3	.04116	8.2815	.00216	251.41	118.42	.01489	1.01260	.6876
500.	3.7592	7490.6	.04102	8.2561	.00195	269.83	127.11	.01773	1.01137	.6866
550.	3.4260	8225.1	.04086	8.2348	.00177	287.96	135.54	.02076	1.01036	.6859
600.	3.1473	8964.3	.04069	8.2166	.00163	305.80	143.72	.02399	1.00951	.6853
700.	2.7072	10462.9	.04030	8.1873	.00140	340.80	159.48	.03099	1.00818	.6844
800.	2.3753	12000.5	.03983	8.1649	.00123	375.39	174.56	.03868	1.00717	.6841
900.	2.1159	13588.2	.03927	8.1471	.00109	410.06	189.07	.04703	1.00639	.6840
1000.	1.9077	15233.8	.03862	8.1328	.00098	445.11	203.11	.05603	1.00576	.6840
1200.	1.5940	18699.5	.03720	8.1111	.00082	511.13	229.99	.07510	1.00481	.6917
1400.	1.3690	22391.6	.03574	8.0954	.00071	583.34	255.60	.09705	1.00413	.6926
1600.	1.1996	26230.7	.03445	8.0836	.00062	655.60	280.14	.12127	1.00362	.6933
1800.	1.0675	30202.3	.03331	8.0742	.00055	728.49	303.74	.14778	1.00322	.6931
2000.	.9616	34436.3	.03214	8.0662	.00050	806.90	326.49	.17691	1.00290	.6909
2200.	.8747	39158.2	.03077	8.0583	.00045	899.69	344.90	.20958	1.00264	.6773
2400.	.8018	44772.0	.02901	8.0486	.00041	1022.21	366.28	.24754	1.00242	.6643
2600.	.7396	51870.2	.02676	8.0341	.00038	1196.75	387.27	.29326	1.00223	.6428
2800.	.6854	61210.3	.02407	8.0108	.00036	1451.67	408.05	.34929	1.00207	.6136
3000.	.6372	73647.0	.02115	7.9735	.00033	1819.14	428.89	.41728	1.00192	.5807

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

9.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 16.532	.01228	1.6961	1.017	-303.0	-192.5	5.162	5.04	6.55	1486.
17.	.01232	1.6692	1.016	-300.3	-189.4	5.347	5.12	6.71	1480.
18.	.01241	1.6121	1.002	-294.2	-182.5	5.739	5.28	7.01	1463.
19.	.01251	1.5533	1.004	-287.9	-175.3	6.128	5.44	7.37	1451.
20.	.01262	1.4930	1.001	-281.3	-167.8	6.514	5.58	7.71	1437.
21.	.01272	1.4335	.9948	-274.4	-159.9	6.899	5.70	8.05	1423.
22.	.01284	1.3811	.9860	-267.3	-151.7	7.280	5.81	8.36	1410.
23.	.01296	1.3275	.9747	-259.8	-143.2	7.659	5.91	8.67	1396.
24.	.01309	1.2824	.9620	-252.1	-134.4	8.035	5.99	8.96	1385.
25.	.01322	1.2282	.9484	-244.2	-125.2	8.407	6.07	9.27	1369.
26.	.01336	1.1751	.9332	-236.0	-115.8	8.777	6.14	9.58	1354.
27.	.01350	1.1227	.9168	-227.6	-106.1	9.144	6.21	9.90	1337.
28.	.01365	1.0720	.8993	-218.9	-96.0	9.510	6.27	10.21	1321.
29.	.01381	1.0233	.8808	-210.0	-85.7	9.873	6.33	10.53	1304.
30.	.01398	.9744	.8614	-200.8	-75.0	10.235	6.38	10.84	1287.
31.	.01416	.9290	.8410	-191.4	-64.0	10.596	6.42	11.15	1270.
32.	.01435	.8838	.8197	-181.8	-52.7	10.955	6.46	11.47	1252.
33.	.01454	.8397	.7978	-171.9	-41.0	11.313	6.50	11.79	1234.
34.	.01475	.7976	.7752	-161.8	-29.1	11.670	6.53	12.10	1216.
36.	.01519	.7185	.7291	-141.0	-4.3	12.379	6.58	12.73	1179.
38.	.01569	.6459	.6826	-119.4	21.8	13.085	6.62	13.37	1142.
40.	.01624	.5822	.6363	-96.9	49.2	13.786	6.64	13.97	1107.
42.	.01684	.5245	.5904	-73.8	77.7	14.482	6.66	14.57	1072.
44.	.01751	.4773	.5459	-50.2	107.4	15.173	6.68	15.10	1039.
46.	.01825	.4369	.5033	-26.6	137.6	15.843	6.73	15.51	1006.
48.	.01905	.4034	.4633	-2.1	169.3	16.518	6.78	16.05	977.
50.	.01991	.3760	.4263	22.5	201.7	17.180	6.82	16.41	951.
52.	.02084	.3558	.3925	47.2	234.8	17.828	6.86	16.54	929.
56.	.02286	.3306	.3341	96.4	302.1	19.076	6.94	16.83	895.
60.	.02505	.3212	.2873	143.8	369.2	20.233	7.01	16.68	874.
65.	.02791	.3258	.2419	200.5	451.6	21.552	7.14	16.23	861.
70.	.03081	.3399	.2079	254.3	531.6	22.738	7.33	15.77	855.
75.	.03370	.3585	.1821	306.3	609.6	23.814	7.58	15.46	855.
80.	.03657	.3799	.1621	357.3	686.4	24.806	7.89	15.29	858.
90.	.04220	.4268	.1332	459.2	839.0	26.603	8.64	15.30	869.
100.	.04769	.4760	.1133	564.1	993.3	28.228	9.46	15.59	886.
110.	.05303	.5257	.0989	675.6	1152.9	29.748	10.34	16.09	905.
120.	.05827	.5749	.0878	791.3	1315.7	31.165	11.04	16.50	927.
130.	.06342	.6233	.0791	911.6	1482.4	32.499	11.59	16.84	952.
140.	.06836	.6684	.0720	1035.3	1650.5	33.745	11.99	17.06	975.
160.	.07827	.7615	.0610	1288.1	1992.6	36.029	12.35	17.14	1028.
180.	.08802	.8524	.0533	1541.5	2333.6	38.038	12.30	16.94	1084.
200.	.09765	.9417	.0473	1790.0	2668.8	39.803	12.04	16.57	1138.
220.	.10719	1.0298	.0426	2031.4	2996.1	41.363	11.72	16.17	1192.
240.	.11666	1.1169	.0388	2265.6	3315.6	42.753	11.40	15.80	1244.
260.	.12608	1.2033	.0356	2493.5	3628.3	44.005	11.14	15.49	1293.
280.	.13546	1.2890	.0329	2716.3	3935.4	45.143	10.93	15.24	1341.
300.	.14491	1.3769	.0306	2936.3	4240.5	46.194	10.78	15.05	1387.
350.	.16814	1.5878	.0260	3472.0	4985.3	48.489	10.55	14.77	1491.
400.	.19128	1.7971	.0227	3999.0	5720.5	50.454	10.46	14.65	1587.
450.	.21435	2.0055	.0201	4522.1	6451.3	52.177	10.43	14.60	1676.
500.	.23737	2.2133	.0181	5044.7	7181.0	53.713	10.42	14.58	1760.
550.	.26038	2.4207	.0164	5566.3	7909.7	55.102	10.42	14.58	1840.
600.	.28336	2.6278	.0150	6088.6	8638.8	56.370	10.44	14.58	1916.
700.	.32928	3.0414	.0129	7135.5	10099.0	58.622	10.49	14.63	2059.
800.	.37517	3.4546	.0113	8189.3	11565.8	60.579	10.58	14.71	2192.
900.	.42104	3.8676	.0100	9253.5	13042.9	62.317	10.70	14.84	2315.
1000.	.46690	4.2803	.0090	10331.4	14533.5	63.890	10.86	14.99	2430.
1200.	.55859	5.1056	.0075	12542.6	17569.9	66.645	11.25	15.37	2642.
1400.	.65027	5.9306	.0064	14835.7	20688.1	69.053	11.68	15.81	2833.
1600.	.74194	6.7556	.0056	17214.6	23892.0	71.169	12.10	16.22	3010.
1800.	.83361	7.5805	.0050	19679.9	27182.5	73.068	12.50	16.62	3176.
2000.	.92534	8.4054	.0045	22236.3	30564.3	74.916	12.93	17.07	3330.
2200.	1.01722	9.2302	.0041	24889.0	34044.0	77.246	13.49	17.65	3475.
2400.	1.10951	10.0551	.0037	27677.4	37663.0	79.866	14.28	18.49	3608.
2600.	1.20268	10.8799	.0035	30664.3	41488.4	82.701	15.44	19.75	3730.
2800.	1.29751	11.7047	.0032	33944.7	45622.3	85.628	17.13	21.62	3843.
3000.	1.39517	12.5295	.0030	37646.8	50203.3	88.508	19.47	24.27	3950.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

9.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 16.532	81.4554	890.6	.24789	138.1552	.00736	103.29	310.83	.00070	1.26725	1.9726
17.	81.1730	895.3	.24453	135.4970	.00750	105.96	294.51	.00070	1.26625	1.8654
18.	80.5602	908.4	.23555	129.8708	.00772	110.89	264.86	.00071	1.26408	1.6748
19.	79.9262	911.5	.23085	124.1492	.00809	114.46	240.66	.00070	1.26184	1.5495
20.	79.2690	912.1	.22638	118.3460	.00846	117.86	220.56	.00069	1.25952	1.4437
21.	78.5863	911.4	.22206	112.6518	.00883	121.60	203.59	.00069	1.25711	1.3474
22.	77.8849	912.3	.21792	107.5642	.00917	124.58	189.18	.00069	1.25463	1.2698
23.	77.1580	911.2	.21391	102.4278	.00952	126.89	176.72	.00068	1.25207	1.2077
24.	76.4138	912.7	.21005	97.9929	.00982	128.64	165.92	.00068	1.24946	1.1556
25.	75.6484	908.3	.20647	92.9139	.01021	129.92	156.44	.00067	1.24677	1.1164
26.	74.8671	903.3	.20287	87.9744	.01061	130.73	148.08	.00066	1.24403	1.0853
27.	74.0636	897.6	.19929	83.1542	.01103	131.19	140.60	.00064	1.24122	1.0607
28.	73.2363	891.6	.19571	78.5108	.01145	131.32	133.86	.00063	1.23832	1.0410
29.	72.3874	885.2	.19222	74.0713	.01189	131.19	127.75	.00062	1.23536	1.0251
30.	71.5159	877.3	.18886	69.6865	.01236	130.81	122.17	.00061	1.23232	1.0128
31.	70.6190	870.2	.18541	65.6080	.01282	129.74	117.04	.00059	1.22920	1.0063
32.	69.7035	862.1	.18194	61.6012	.01331	128.52	112.31	.00058	1.22602	1.0025
33.	68.7655	853.2	.17852	57.7454	.01382	127.19	107.93	.00056	1.22277	1.0003
34.	67.8035	844.2	.17509	54.0768	.01433	125.78	103.84	.00055	1.21944	.9991
36.	65.8160	825.8	.16828	47.2894	.01542	122.73	96.44	.00053	1.21258	1.0004
38.	63.7448	806.4	.16169	41.1748	.01658	119.44	89.88	.00050	1.20545	1.0059
40.	61.5924	787.5	.15556	35.8566	.01775	116.00	84.01	.00049	1.19808	1.0120
42.	59.3733	768.8	.14938	31.1432	.01896	112.49	78.75	.00047	1.19051	1.0203
44.	57.1032	754.0	.14317	27.2551	.02003	109.01	74.04	.00046	1.18280	1.0257
46.	54.8048	742.8	.13637	23.9435	.02102	105.64	69.85	.00044	1.17503	1.0323
48.	52.5005	733.5	.13018	21.1785	.02188	102.63	66.14	.00044	1.16727	1.0341
50.	50.2172	726.6	.12445	18.8815	.02258	100.02	62.90	.00044	1.15962	1.0318
52.	47.9789	723.9	.11919	17.0716	.02299	97.58	60.10	.00044	1.15215	1.0250
56.	43.7402	728.2	.11003	14.4600	.02311	93.45	55.69	.00046	1.13810	1.0029
60.	39.9253	744.7	.10261	12.8224	.02240	90.46	52.65	.00049	1.12555	.9710
65.	35.8352	783.4	.09456	11.6755	.02072	88.58	50.28	.00055	1.11221	.9213
70.	32.4579	837.2	.08742	11.0340	.01884	87.90	49.04	.00062	1.10127	.8800
75.	29.6713	903.0	.08098	10.6364	.01712	87.19	48.52	.00068	1.09230	.8604
80.	27.3427	979.8	.07513	10.3866	.01560	88.31	48.46	.00076	1.08485	.8390
90.	23.6951	1161.6	.06508	10.1123	.01317	94.76	49.17	.00094	1.07324	.7938
100.	20.9705	1373.4	.05715	9.9825	.01135	102.10	50.54	.00112	1.06463	.7719
110.	18.8557	1613.1	.05073	9.9125	.00998	109.74	51.58	.00130	1.05798	.7563
120.	17.1614	1854.0	.04637	9.8667	.00890	117.90	53.18	.00150	1.05268	.7444
130.	15.7685	2091.9	.04329	9.8278	.00805	125.89	55.03	.00171	1.04833	.7361
140.	14.6292	2317.2	.04104	9.7779	.00736	133.13	57.02	.00192	1.04478	.7306
160.	12.7759	2732.3	.03870	9.7290	.00627	145.09	61.23	.00238	1.03903	.7234
180.	11.3611	3080.3	.03812	9.6846	.00550	154.43	65.53	.00289	1.03466	.7188
200.	10.2409	3378.9	.03836	9.6442	.00491	162.21	69.84	.00344	1.03120	.7136
220.	9.3295	3647.4	.03896	9.6075	.00443	169.23	74.11	.00404	1.02840	.7081
240.	8.5719	3902.3	.03965	9.5739	.00405	175.97	78.32	.00468	1.02607	.7031
260.	7.9313	4155.2	.04026	9.5434	.00373	182.69	82.46	.00535	1.02410	.6991
280.	7.3821	4411.2	.04074	9.5155	.00346	189.51	86.53	.00606	1.02242	.6960
300.	6.9007	4680.3	.04108	9.5020	.00322	196.48	90.52	.00681	1.02095	.6935
350.	5.9473	5359.9	.04148	9.4431	.00276	214.49	100.22	.00879	1.01803	.6903
400.	5.2280	6066.4	.04150	9.3954	.00241	232.99	109.54	.01095	1.01584	.6887
450.	4.6654	6791.2	.04135	9.3564	.00215	251.57	118.51	.01329	1.01413	.6880
500.	4.2127	7519.8	.04119	9.3241	.00194	269.97	127.19	.01582	1.01275	.6869
550.	3.8406	8254.5	.04101	9.2969	.00177	288.08	135.60	.01852	1.01162	.6861
600.	3.5291	8993.9	.04082	9.2738	.00162	305.90	143.78	.02140	1.01067	.6855
700.	3.0369	10493.0	.04042	9.2366	.00139	340.88	159.53	.02762	1.00918	.6846
800.	2.6654	12030.9	.03993	9.2081	.00122	375.46	174.60	.03447	1.00805	.6842
900.	2.3751	13619.0	.03936	9.1857	.00109	410.12	189.10	.04190	1.00717	.6840
1000.	2.1418	15264.9	.03870	9.1675	.00098	445.16	203.13	.04991	1.00647	.6841
1200.	1.7902	18731.6	.03726	9.1401	.00082	511.13	230.02	.06686	1.00540	.6918
1400.	1.5378	22424.6	.03579	9.1203	.00070	583.33	255.61	.08639	1.00464	.6926
1600.	1.3478	26264.0	.03449	9.1053	.00062	655.58	280.15	.10793	1.00407	.6933
1800.	1.1996	30233.2	.03335	9.0935	.00055	728.34	303.75	.13150	1.00362	.6932
2000.	1.0807	34456.0	.03219	9.0836	.00050	806.29	326.50	.15737	1.00326	.6911
2200.	.9831	39144.5	.03084	9.0740	.00045	897.77	344.90	.18631	1.00297	.6779
2400.	.9013	44679.3	.02913	9.0626	.00041	1017.26	366.27	.21980	1.00272	.6656
2600.	.8315	51619.0	.02696	9.0464	.00038	1185.77	387.25	.25996	1.00251	.6450
2800.	.7707	60678.6	.02435	9.0209	.00036	1430.09	408.01	.30900	1.00232	.6168
3000.	.7168	72666.6	.02149	8.9806	.00033	1780.65	428.79	.36848	1.00216	.5845

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

10.00 MPA ISOBAR

	TEMPERATURE	VOLUME	ISOTHERM DERIVATIVE	ISOCHORE DERIVATIVE	INTERNAL ENERGY	ENTHALPY	ENTROPY	CV	CP	VELOCITY OF SOUND
	K	CU M/KG	CU M-MPA/KG	MPA/K	KJ/KG-K	KJ/KG	KJ/KG-K	KJ / KG-K		M/S
*	16.808	.01221	1.7491	1.024	-302.1	-179.9	5.181	5.07	6.58	1506.
	17.	.01223	1.7383	1.024	-301.0	-178.6	5.256	5.11	6.64	1503.
	18.	.01232	1.6821	1.021	-295.1	-171.8	5.645	5.27	6.97	1491.
	19.	.01241	1.6243	1.012	-288.9	-164.7	6.029	5.42	7.27	1476.
	20.	.01251	1.5672	1.011	-282.4	-157.3	6.411	5.57	7.51	1464.
	21.	.01262	1.5088	1.006	-275.7	-149.5	6.790	5.69	7.93	1450.
	22.	.01272	1.4503	.9983	-268.7	-141.4	7.166	5.80	8.25	1436.
	23.	.01284	1.3999	.9884	-261.4	-133.1	7.539	5.90	8.55	1424.
	24.	.01296	1.3481	.9764	-253.9	-124.4	7.909	5.99	8.84	1410.
	25.	.01308	1.3034	.9632	-246.2	-115.4	8.276	6.07	9.12	1399.
	26.	.01321	1.2515	.9495	-238.2	-106.1	8.640	6.14	9.41	1385.
	27.	.01335	1.2002	.9342	-230.0	-96.5	9.000	6.21	9.71	1370.
	28.	.01349	1.1494	.9179	-221.6	-86.7	9.359	6.28	10.01	1354.
	29.	.01364	1.1003	.9005	-212.9	-76.5	9.715	6.34	10.31	1338.
	30.	.01379	1.0532	.8822	-204.0	-66.1	10.070	6.38	10.60	1322.
	31.	.01396	1.0079	.8630	-194.9	-55.3	10.422	6.43	10.89	1307.
	32.	.01413	.9630	.8431	-185.5	-44.3	10.773	6.47	11.19	1290.
	33.	.01431	.9196	.8225	-176.0	-32.9	11.121	6.51	11.48	1273.
	34.	.01449	.8772	.8012	-166.3	-21.3	11.468	6.54	11.77	1256.
	36.	.01490	.7978	.7574	-146.2	2.8	12.157	6.60	12.34	1221.
	38.	.01534	.7254	.7129	-125.3	28.0	12.840	6.64	12.90	1187.
	40.	.01582	.6588	.6686	-103.8	54.4	13.516	6.66	13.46	1153.
	42.	.01635	.6014	.6249	-81.7	81.8	14.185	6.68	13.98	1121.
	44.	.01693	.5501	.5821	-59.1	110.3	14.847	6.70	14.47	1090.
	46.	.01757	.5076	.5408	-36.5	139.2	15.489	6.76	14.94	1059.
	48.	.01825	.4709	.5016	-13.0	169.5	16.133	6.81	15.35	1031.
	50.	.01899	.4405	.4649	10.7	200.5	16.767	6.85	15.69	1005.
	52.	.01977	.4159	.4308	34.5	232.2	17.388	6.89	15.96	982.
	56.	.02148	.3825	.3711	82.2	297.0	18.589	6.97	16.27	945.
	60.	.02334	.3655	.3218	128.9	362.3	19.714	7.04	16.30	920.
	65.	.02580	.3615	.2729	185.3	443.3	21.012	7.17	16.09	901.
	70.	.02835	.3702	.2352	239.6	523.0	22.193	7.36	15.76	891.
	75.	.03090	.3855	.2062	292.2	601.2	23.272	7.61	15.50	886.
	80.	.03345	.4039	.1835	343.8	678.3	24.267	7.91	15.38	886.
	90.	.03848	.4468	.1505	447.1	831.9	26.077	8.66	15.41	892.
	100.	.04342	.4938	.1278	553.2	987.4	27.714	9.48	15.71	905.
	110.	.04824	.5422	.1113	665.8	1148.2	29.246	10.35	16.20	921.
	120.	.05297	.5907	.0987	782.4	1312.1	30.672	11.05	16.51	942.
	130.	.05763	.6389	.0888	903.5	1479.7	32.014	11.61	16.93	965.
	140.	.06221	.6861	.0807	1028.0	1650.1	33.276	12.00	17.15	990.
	160.	.07104	.7761	.0682	1282.0	1992.4	35.562	12.36	17.21	1039.
	180.	.07985	.8673	.0595	1536.2	2334.7	37.578	12.31	16.99	1094.
	200.	.08854	.9568	.0528	1785.4	2670.8	39.348	12.05	16.62	1148.
	220.	.09715	1.0451	.0475	2027.3	2998.8	40.912	11.73	16.21	1202.
	240.	.10570	1.1324	.0432	2262.0	3319.0	42.305	11.41	15.83	1253.
	260.	.11419	1.2190	.0396	2490.3	3632.2	43.559	11.15	15.51	1302.
	280.	.12265	1.3049	.0366	2713.3	3939.9	44.699	10.94	15.27	1349.
	300.	.13119	1.3936	.0340	2933.8	4245.7	45.752	10.79	15.07	1395.
	350.	.15212	1.6046	.0290	3470.0	4991.2	48.050	10.56	14.79	1499.
	400.	.17295	1.8141	.0252	3997.5	5727.0	50.016	10.46	14.56	1594.
	450.	.19373	2.0226	.0224	4520.9	6458.2	51.740	10.43	14.61	1683.
	500.	.21446	2.2304	.0201	5043.7	7188.3	53.277	10.42	14.59	1767.
	550.	.23517	2.4378	.0182	5565.5	7917.2	54.666	10.43	14.58	1846.
	600.	.25586	2.6449	.0167	6087.9	8646.5	55.934	10.44	14.59	1922.
	700.	.29720	3.0586	.0143	7135.0	10106.9	58.187	10.49	14.63	2065.
	800.	.33850	3.4718	.0125	8188.9	11573.9	60.144	10.58	14.71	2197.
	900.	.37979	3.8847	.0111	9253.3	13051.2	61.882	10.71	14.84	2320.
	1000.	.42106	4.2974	.0100	10331.2	14541.9	63.456	10.86	14.99	2435.
	1200.	.50359	5.1227	.0083	12542.5	17578.4	66.211	11.25	15.37	2646.
	1400.	.58610	5.9477	.0071	14835.7	20696.7	68.618	11.68	15.81	2837.
	1600.	.66860	6.7726	.0062	17214.6	23900.6	70.734	12.10	16.22	3014.
	1800.	.75111	7.5975	.0056	19679.8	27190.9	72.634	12.49	16.62	3179.
	2000.	.83366	8.4223	.0050	22235.5	30572.0	74.481	12.93	17.06	3334.
	2200.	.91634	9.2471	.0045	24885.8	34049.2	76.810	13.47	17.63	3478.
	2400.	.99937	10.0720	.0042	27668.2	37661.9	79.427	14.24	18.44	3612.
	2600.	1.08316	10.8968	.0038	30641.9	41473.4	82.256	15.35	19.65	3734.
	2800.	1.16836	11.7216	.0036	33896.7	45580.4	85.174	16.97	21.44	3848.
	3000.	1.25599	12.5464	.0033	37554.2	50114.1	88.037	19.21	23.97	3955.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

10.00 MPA ISOBAR

	TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DV)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
*	16.808	81.8729	919.9	.24645	143.2003	.00715	106.03	316.91	.00071	1.26874	1.9661
	17.	81.7600	922.0	.24510	142.1202	.00720	107.12	309.94	.00071	1.26834	1.9216
	18.	81.1621	931.5	.23860	136.5241	.00748	112.22	278.08	.00071	1.26621	1.7262
	19.	80.5558	939.9	.23167	130.8463	.00774	115.98	252.38	.00071	1.26407	1.5825
	20.	79.9218	942.6	.22727	125.2542	.00807	119.53	230.97	.00071	1.26182	1.4701
	21.	79.2664	943.0	.22304	119.5946	.00841	123.45	212.99	.00071	1.25951	1.3687
	22.	78.5887	941.9	.21893	113.9783	.00876	126.57	197.68	.00070	1.25711	1.2884
	23.	77.8936	942.9	.21502	109.0437	.00906	129.04	184.56	.00070	1.25466	1.2223
	24.	77.1767	941.9	.21121	104.0384	.00939	130.93	173.15	.00069	1.25214	1.1691
	25.	76.4428	942.9	.20758	99.6355	.00967	132.34	163.18	.00068	1.24956	1.1240
	26.	75.6908	939.1	.20418	94.7233	.01002	133.27	154.38	.00067	1.24692	1.0904
	27.	74.9239	934.7	.20070	89.9249	.01039	133.85	146.57	.00066	1.24423	1.0633
	28.	74.1366	929.4	.19723	85.2159	.01077	134.11	139.55	.00065	1.24147	1.0417
	29.	73.3292	923.7	.19384	80.6839	.01116	134.10	133.20	.00064	1.23865	1.0241
	30.	72.5015	917.6	.19059	76.3574	.01155	133.85	127.43	.00063	1.23576	1.0093
	31.	71.6523	911.6	.18727	72.2213	.01195	132.88	122.13	.00061	1.23280	1.0011
	32.	70.7876	904.6	.18397	68.1673	.01237	131.78	117.27	.00060	1.22979	.9956
	33.	69.9026	897.2	.18070	64.2839	.01279	130.55	112.77	.00059	1.22671	.9915
	34.	68.9988	889.2	.17743	60.5268	.01324	129.26	108.59	.00057	1.22358	.9888
	36.	67.1359	872.9	.17091	53.5628	.01414	126.44	101.05	.00055	1.21713	.9864
	38.	65.2037	856.2	.16457	47.2967	.01507	123.38	94.40	.00053	1.21047	.9874
	40.	63.2056	838.2	.15871	41.6392	.01606	120.18	88.48	.00051	1.20360	.9908
	42.	61.1498	822.5	.15292	36.7751	.01699	116.88	83.17	.00049	1.19657	.9945
	44.	59.0530	807.9	.14703	32.4879	.01792	113.60	78.42	.00048	1.18942	.9991
	46.	56.9271	798.2	.14050	28.8948	.01872	110.41	74.15	.00047	1.18221	1.0034
	48.	54.7942	789.5	.13451	25.8049	.01944	107.36	70.37	.00046	1.17499	1.0058
	50.	52.6712	783.0	.12889	23.2021	.02004	104.64	67.02	.00046	1.16785	1.0048
	52.	50.5770	779.2	.12366	21.0339	.02048	102.27	64.09	.00046	1.16082	1.0001
	56.	46.5526	780.7	.11439	17.8052	.02084	98.15	59.34	.00047	1.14741	.9836
	60.	42.8456	793.3	.10669	15.6610	.02055	95.05	55.91	.00049	1.13515	.9588
	65.	38.7532	825.8	.09822	14.0104	.01948	92.92	53.06	.00054	1.12172	.9186
	70.	35.2794	875.2	.09063	13.0614	.01801	91.90	51.41	.00059	1.11040	.8818
	75.	32.3603	938.1	.08376	12.4759	.01653	90.89	50.57	.00065	1.10095	.8627
	80.	29.8978	1011.8	.07755	12.0748	.01520	91.69	50.28	.00072	1.09303	.8431
	90.	25.9853	1189.0	.06691	11.6098	.01296	97.71	50.65	.00088	1.08052	.7991
	100.	23.0330	1398.1	.05857	11.3739	.01124	104.71	51.78	.00104	1.07115	.7770
	110.	20.7294	1636.3	.05186	11.2403	.00990	112.33	52.78	.00120	1.06387	.7614
	120.	18.8773	1876.1	.04731	11.1500	.00885	120.12	54.17	.00138	1.05805	.7490
	130.	17.3533	2114.6	.04407	11.0865	.00801	127.81	55.86	.00157	1.05328	.7400
	140.	16.0754	2343.2	.04183	11.0295	.00732	134.81	57.73	.00176	1.04929	.7345
	160.	14.0768	2754.6	.03922	10.9245	.00625	146.38	61.77	.00218	1.04306	.7261
	180.	12.5242	3103.3	.03857	10.8616	.00548	155.45	65.96	.00263	1.03825	.7211
	200.	11.2944	3402.7	.03877	10.8066	.00488	163.03	70.20	.00313	1.03445	.7155
	220.	10.2934	3671.7	.03934	10.7578	.00441	169.90	74.41	.00367	1.03136	.7097
	240.	9.4610	3927.2	.03999	10.7141	.00403	176.53	78.57	.00424	1.02880	.7045
	260.	8.7570	4180.5	.04058	10.6747	.00371	183.16	82.68	.00485	1.02664	.7003
	280.	8.1531	4436.9	.04104	10.6392	.00344	189.92	86.72	.00549	1.02478	.6972
	300.	7.6226	4707.8	.04136	10.6229	.00320	196.83	90.70	.00617	1.02316	.6945
	350.	6.5738	5387.9	.04172	10.5486	.00274	214.75	100.36	.00795	1.01995	.6910
	400.	5.7819	6095.0	.04171	10.4889	.00241	233.20	109.65	.00990	1.01753	.6893
	450.	5.1619	6820.1	.04153	10.4403	.00214	251.74	118.60	.01202	1.01564	.6884
	500.	4.6628	7549.0	.04135	10.4000	.00193	270.11	127.27	.01430	1.01412	.6873
	550.	4.2523	8284.0	.04115	10.3662	.00176	288.20	135.67	.01673	1.01287	.6864
	600.	3.9084	9023.6	.04095	10.3375	.00162	306.00	143.84	.01932	1.01183	.6857
	700.	3.3648	10523.1	.04053	10.2915	.00139	340.96	159.58	.02493	1.01017	.6847
	800.	2.9542	12061.3	.04003	10.2563	.00122	375.53	174.64	.03110	1.00893	.6843
	900.	2.6330	13649.8	.03944	10.2286	.00109	410.18	189.14	.03780	1.00796	.6841
	1000.	2.3749	15296.1	.03877	10.2062	.00098	445.21	203.15	.04501	1.00717	.6841
	1200.	1.9857	18763.6	.03732	10.1723	.00082	511.13	230.04	.06028	1.00600	.6919
	1400.	1.7062	22457.5	.03584	10.1479	.00070	583.33	255.63	.07787	1.00515	.6927
	1600.	1.4957	26297.3	.03453	10.1295	.00062	655.56	280.16	.09726	1.00451	.6934
	1800.	1.3314	30264.6	.03339	10.1150	.00055	728.21	303.77	.11847	1.00402	.6933
	2000.	1.1995	34478.0	.03224	10.1029	.00049	805.77	326.51	.14174	1.00362	.6913
	2200.	1.0913	39138.3	.03091	10.0914	.00045	896.14	344.90	.16772	1.00329	.6784
	2400.	1.0006	44606.5	.02924	10.0783	.00041	1013.06	366.26	.19767	1.00302	.6666
	2600.	.9232	51412.3	.02713	10.0602	.00038	1176.48	387.23	.23343	1.00278	.6469
	2800.	.8559	60234.6	.02459	10.0325	.00036	1411.82	407.97	.27698	1.00258	.6195
	3000.	.7962	71842.6	.02179	9.9893	.00033	1748.06	423.71	.32975	1.00240	.5879

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

12.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 17.346	.01210	1.8521	1.038	-300.1	-154.9	5.220	5.15	6.53	1544.
18.	.01215	1.8168	1.037	-296.3	-150.5	5.469	5.25	6.83	1537.
19.	.01224	1.7629	1.035	-290.4	-143.6	5.847	5.41	7.13	1525.
20.	.01233	1.7091	1.031	-284.2	-136.3	6.220	5.54	7.43	1514.
21.	.01242	1.6510	1.027	-277.7	-128.7	6.588	5.67	7.74	1501.
22.	.01252	1.5973	1.021	-271.0	-120.9	6.955	5.79	8.04	1489.
23.	.01262	1.5426	1.013	-264.1	-112.7	7.319	5.89	8.33	1477.
24.	.01272	1.4862	1.003	-256.9	-104.2	7.679	5.98	8.61	1463.
25.	.01284	1.4391	.9916	-249.5	-95.5	8.036	6.07	8.88	1451.
26.	.01295	1.3900	.9786	-241.9	-86.4	8.390	6.14	9.15	1439.
27.	.01307	1.3454	.9647	-234.0	-77.2	8.740	6.21	9.41	1427.
28.	.01320	1.2977	.9507	-226.0	-67.6	9.087	6.28	9.68	1414.
29.	.01333	1.2500	.9353	-217.7	-57.8	9.431	6.34	9.95	1400.
30.	.01346	1.2023	.9191	-209.3	-47.7	9.773	6.40	10.22	1386.
31.	.01360	1.1560	.9019	-200.6	-37.4	10.112	6.45	10.48	1371.
32.	.01375	1.1136	.8840	-191.8	-26.8	10.449	6.49	10.74	1357.
33.	.01391	1.0707	.8655	-182.8	-15.9	10.784	6.53	11.00	1343.
34.	.01406	1.0288	.8465	-173.5	-4.8	11.116	6.57	11.25	1327.
36.	.01440	.9495	.8069	-154.6	18.2	11.773	6.63	11.75	1297.
38.	.01477	.8776	.7663	-135.0	42.2	12.421	6.68	12.22	1267.
40.	.01517	.8101	.7249	-114.9	67.1	13.060	6.71	12.68	1237.
42.	.01559	.7470	.6841	-94.2	92.9	13.689	6.73	13.13	1207.
44.	.01606	.6919	.6441	-73.1	119.6	14.309	6.76	13.56	1178.
46.	.01655	.6457	.6052	-52.1	146.6	14.909	6.82	13.96	1150.
48.	.01708	.6042	.5677	-30.1	174.9	15.511	6.86	14.33	1124.
50.	.01765	.5690	.5319	-7.9	203.9	16.103	6.90	14.65	1099.
52.	.01825	.5385	.4982	14.5	233.5	16.683	6.94	14.93	1076.
56.	.01955	.4916	.4373	59.8	294.3	17.811	7.02	15.35	1036.
60.	.02096	.4623	.3851	104.7	356.2	18.877	7.10	15.55	1007.
65.	.02285	.4435	.3313	159.9	434.2	20.127	7.23	15.63	979.
70.	.02485	.4390	.2881	214.1	512.3	21.284	7.42	15.59	961.
75.	.02689	.4458	.2537	267.3	589.9	22.355	7.67	15.49	949.
80.	.02895	.4593	.2260	319.8	667.2	23.353	7.97	15.42	943.
90.	.03307	.4942	.1853	425.0	821.8	25.173	8.70	15.54	939.
100.	.03714	.5351	.1571	533.0	978.7	26.826	9.51	15.88	945.
110.	.04115	.5801	.1365	647.3	1141.2	28.374	10.39	16.38	956.
120.	.04511	.6260	.1208	765.5	1306.8	29.815	11.09	16.78	973.
130.	.04901	.6731	.1084	888.0	1476.1	31.170	11.64	17.09	994.
140.	.05285	.7197	.0984	1013.8	1648.0	32.443	12.04	17.30	1017.
160.	.06040	.8125	.0832	1270.3	1995.0	34.760	12.40	17.36	1067.
180.	.06761	.8980	.0723	1526.1	2337.4	36.778	12.34	17.13	1116.
200.	.07490	.9879	.0638	1776.5	2675.3	38.558	12.08	16.70	1169.
220.	.08211	1.0765	.0573	2019.5	3004.8	40.128	11.75	16.27	1221.
240.	.08926	1.1642	.0521	2255.0	3326.1	41.527	11.43	15.89	1272.
260.	.09637	1.2510	.0477	2484.0	3640.4	42.785	11.17	15.57	1321.
280.	.10344	1.3372	.0441	2707.7	3949.0	43.928	10.96	15.31	1367.
300.	.11061	1.4275	.0409	2928.9	4256.2	44.985	10.80	15.11	1413.
350.	.12809	1.6388	.0348	3466.3	5003.3	47.288	10.57	14.81	1516.
400.	.14547	1.8484	.0303	3994.5	5740.2	49.257	10.47	14.68	1610.
450.	.16280	2.0569	.0269	4518.6	6472.2	50.983	10.44	14.62	1697.
500.	.18009	2.2648	.0241	5041.8	7202.9	52.521	10.43	14.60	1780.
550.	.19736	2.4722	.0219	5564.0	7932.3	53.911	10.43	14.59	1859.
600.	.21461	2.6793	.0201	6086.7	8661.9	55.180	10.44	14.59	1935.
700.	.24906	3.0929	.0172	7134.1	10122.9	57.433	10.49	14.63	2077.
800.	.28349	3.5060	.0150	8188.3	11590.2	59.391	10.58	14.72	2208.
900.	.31790	3.9188	.0133	9252.9	13067.7	61.130	10.71	14.84	2330.
1000.	.35230	4.3315	.0120	10331.0	14558.6	62.703	10.87	14.99	2445.
1200.	.42107	5.1566	.0100	12542.5	17595.4	65.458	11.25	15.37	2655.
1400.	.48983	5.9815	.0086	14835.8	20713.8	67.866	11.68	15.81	2845.
1600.	.55859	6.8063	.0075	17214.8	23917.8	69.982	12.10	16.22	3021.
1800.	.62734	7.6311	.0067	19679.7	27207.8	71.881	12.49	16.62	3186.
2000.	.69613	8.4559	.0060	22234.2	30587.7	73.728	12.92	17.05	3341.
2200.	.76502	9.2807	.0055	24880.8	34061.0	76.055	13.44	17.59	3485.
2400.	.83417	10.1055	.0050	27653.4	37663.5	78.668	14.17	18.36	3619.
2600.	.90390	10.9302	.0046	30605.8	41452.7	81.488	15.21	19.50	3742.
2800.	.97471	11.7550	.0043	33819.7	45516.2	84.389	16.71	21.15	3857.
3000.	1.04737	12.5798	.0040	37405.3	49973.8	87.227	18.78	23.48	3965.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

12.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 17.346	82.6756	977.1	.24393	153.1232	.00678	111.38	329.05	.00073	1.27159	1.9572
18.	82.3055	984.2	.23990	149.5335	.00694	114.78	306.11	.00074	1.27027	1.8211
19.	81.7264	993.1	.23428	144.0750	.00718	118.83	276.63	.00073	1.26822	1.6609
20.	81.1312	999.7	.22926	138.6583	.00744	122.68	252.39	.00073	1.26611	1.5293
21.	80.5315	1001.9	.22488	132.9611	.00772	126.94	232.38	.00073	1.26398	1.4161
22.	79.9020	1004.2	.22092	127.6311	.00800	130.37	215.25	.00073	1.26175	1.3267
23.	79.2534	1004.6	.21711	122.2533	.00829	133.10	200.58	.00073	1.25946	1.2547
24.	78.5874	1002.8	.21339	116.7973	.00859	135.25	187.90	.00072	1.25711	1.1966
25.	77.9077	1004.0	.20984	112.1185	.00884	136.90	176.88	.00071	1.25471	1.1472
26.	77.2094	1003.1	.20637	107.3243	.00912	138.06	167.16	.00070	1.25225	1.1075
27.	76.4976	1003.4	.20295	102.9186	.00937	138.85	158.57	.00069	1.24975	1.0742
28.	75.7724	1001.0	.19973	98.3287	.00967	139.32	150.91	.00068	1.24720	1.0483
29.	75.0316	997.5	.19654	93.7886	.00997	139.52	144.03	.00067	1.24461	1.0269
30.	74.2761	992.6	.19348	89.3044	.01029	139.48	137.80	.00066	1.24196	1.0093
31.	73.5041	987.7	.19035	84.9711	.01061	138.71	132.13	.00065	1.23926	.9987
32.	72.7171	983.8	.18725	80.9801	.01092	137.78	126.94	.00064	1.23651	.9894
33.	71.9150	978.4	.18422	77.0019	.01124	136.73	122.16	.00062	1.23371	.9826
34.	71.1002	972.5	.18122	73.1453	.01157	135.62	117.75	.00061	1.23088	.9771
36.	69.4279	960.2	.17523	65.9188	.01224	133.15	109.84	.00059	1.22507	.9696
38.	67.7045	948.1	.16936	59.4184	.01289	130.44	102.93	.00057	1.21910	.9645
40.	65.9366	934.0	.16391	53.4161	.01357	127.60	96.83	.00055	1.21299	.9619
42.	64.1275	919.3	.15852	47.9026	.01428	124.63	91.39	.00053	1.20677	.9627
44.	62.2808	907.0	.15309	43.0902	.01495	121.65	86.50	.00052	1.20044	.9640
46.	60.4123	900.1	.14699	39.0098	.01551	118.72	82.11	.00051	1.19405	.9658
48.	58.5352	893.0	.14137	35.3675	.01605	115.90	78.17	.00050	1.18766	.9668
50.	56.6572	887.8	.13601	32.2400	.01650	113.21	74.64	.00049	1.18129	.9658
52.	54.7950	884.0	.13096	29.5076	.01688	110.69	71.49	.00049	1.17500	.9641
56.	51.1592	882.6	.12172	25.1500	.01739	106.49	66.24	.00049	1.16277	.9546
60.	47.7096	890.7	.11377	22.0559	.01746	103.29	62.21	.00050	1.15126	.9369
65.	43.7550	915.6	.10473	19.4053	.01707	100.88	58.59	.00053	1.13815	.9078
70.	40.2475	956.0	.09651	17.6700	.01631	99.42	56.20	.00057	1.12661	.8813
75.	37.1910	1012.6	.08898	16.5807	.01530	98.00	54.74	.00061	1.11662	.8652
80.	34.5429	1082.7	.08212	15.8651	.01425	98.23	53.93	.00066	1.10801	.8469
90.	30.2433	1253.2	.07043	14.9467	.01240	103.49	53.61	.00079	1.09414	.8048
100.	26.9263	1455.9	.06135	14.4084	.01091	109.87	54.26	.00093	1.08352	.7842
110.	24.2990	1690.8	.05407	14.0951	.00969	117.55	55.28	.00106	1.07516	.7700
120.	22.1672	1927.9	.04913	13.8769	.00870	124.64	56.24	.00121	1.06841	.7571
130.	20.4049	2165.7	.04563	13.7349	.00789	131.77	57.62	.00136	1.06285	.7473
140.	18.9214	2394.3	.04319	13.6180	.00722	138.28	59.24	.00152	1.05819	.7411
160.	16.5567	2808.8	.04053	13.4531	.00618	149.10	62.93	.00187	1.05079	.7329
180.	14.7907	3147.2	.03960	13.2823	.00544	157.60	66.89	.00224	1.04528	.7269
200.	13.3517	3452.3	.03957	13.1900	.00484	164.76	70.96	.00266	1.04081	.7192
220.	12.1790	3722.1	.04007	13.1110	.00437	171.32	75.05	.00311	1.03718	.7129
240.	11.2029	3978.2	.04067	13.0422	.00399	177.71	79.12	.00359	1.03417	.7073
260.	10.3766	4232.1	.04121	12.9814	.00368	184.16	83.16	.00410	1.03162	.7029
280.	9.6672	4489.2	.04163	12.9272	.00341	190.77	87.14	.00464	1.02943	.6994
300.	9.0407	4763.9	.04191	12.9053	.00317	197.57	91.07	.00521	1.02751	.6964
350.	7.8071	5444.9	.04219	12.7940	.00272	215.30	100.65	.00670	1.02372	.6925
400.	6.8741	6152.6	.04212	12.7058	.00239	233.62	109.88	.00834	1.02087	.6904
450.	6.1424	6878.4	.04189	12.6343	.00213	252.08	118.80	.01010	1.01863	.6892
500.	5.5527	7607.9	.04167	12.5755	.00192	270.39	127.43	.01201	1.01683	.6879
550.	5.0669	8343.3	.04144	12.5264	.00175	288.44	135.81	.01405	1.01535	.6869
600.	4.6597	9083.2	.04122	12.4847	.00161	306.22	143.97	.01621	1.01411	.6861
700.	4.0150	10583.3	.04075	12.4180	.00138	341.13	159.68	.02090	1.01215	.6850
800.	3.5275	12122.1	.04022	12.3672	.00121	375.67	174.72	.02605	1.01067	.6845
900.	3.1456	13711.2	.03961	12.3272	.00108	410.30	189.21	.03165	1.00951	.6843
1000.	2.8385	15358.3	.03892	12.2950	.00098	445.31	203.22	.03767	1.00858	.6843
1200.	2.3749	18827.4	.03744	12.2463	.00082	511.13	230.08	.05040	1.00717	.6920
1400.	2.0415	22523.1	.03593	12.2113	.00070	583.33	255.67	.06507	1.00616	.6928
1600.	1.7902	26363.8	.03462	12.1849	.00062	655.52	280.20	.08125	1.00540	.6935
1800.	1.5940	30328.2	.03347	12.1642	.00055	728.00	303.79	.09894	1.00481	.6934
2000.	1.4365	34526.8	.03232	12.1471	.00049	804.93	326.54	.11831	1.00433	.6917
2200.	1.3072	39142.1	.03103	12.1313	.00045	893.52	344.89	.13986	1.00394	.6791
2400.	1.1988	44503.2	.02943	12.1143	.00041	1006.31	366.26	.16456	1.00362	.6684
2600.	1.1063	51093.7	.02741	12.0923	.00038	1161.51	387.21	.19386	1.00334	.6500
2800.	1.0259	59533.9	.02499	12.0599	.00036	1382.38	407.91	.22933	1.00309	.6241
3000.	.9548	70529.5	.02231	12.0108	.00033	1695.49	428.57	.27223	1.00288	.5936

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

14.00 MPA ISOBAR

TEMPERATURE	VOLUME	ISOTHERM DERIVATIVE	ISOCHORE DERIVATIVE	INTERNAL ENERGY	ENTHALPY	ENTROPY	CV	$C^{\flat}$	VELOCITY OF SOUND
K	CU M/KG	CU M-MPA/KG	MPA/K	KJ/KG-K	KJ/KG	KJ/KG-K	KJ / KG-K		M/S
* 17.869	.01198	1.9517	1.052	-298.0	-130.2	5.258	5.21	6.57	1580.
18.	.01199	1.9449	1.052	-297.2	-129.3	5.307	5.24	6.71	1579.
19.	.01207	1.8929	1.051	-291.5	-122.5	5.678	5.39	7.00	1569.
20.	.01216	1.8408	1.049	-285.5	-115.3	6.045	5.53	7.29	1559.
21.	.01224	1.7889	1.045	-279.3	-107.9	6.407	5.65	7.57	1548.
22.	.01233	1.7372	1.039	-272.8	-100.2	6.766	5.77	7.85	1537.
23.	.01242	1.6804	1.036	-266.1	-92.2	7.119	5.87	8.14	1526.
24.	.01252	1.6297	1.027	-259.2	-83.9	7.471	5.97	8.41	1515.
25.	.01262	1.5784	1.017	-252.1	-75.4	7.820	6.05	8.67	1503.
26.	.01273	1.5244	1.006	-244.8	-66.6	8.165	6.14	8.93	1489.
27.	.01283	1.4799	.9933	-237.2	-57.6	8.506	6.21	9.18	1479.
28.	.01295	1.4333	.9796	-229.5	-48.3	8.845	6.28	9.43	1466.
29.	.01306	1.3879	.9652	-221.6	-38.7	9.180	6.35	9.67	1454.
30.	.01318	1.3439	.9509	-213.5	-28.9	9.512	6.40	9.91	1442.
31.	.01331	1.2995	.9355	-205.2	-18.9	9.841	6.46	10.16	1430.
32.	.01344	1.2548	.9194	-196.8	-8.6	10.167	6.51	10.40	1416.
33.	.01357	1.2134	.9025	-188.1	1.9	10.491	6.55	10.63	1403.
34.	.01371	1.1721	.8851	-179.3	12.7	10.812	6.59	10.86	1390.
36.	.01401	1.0925	.8490	-161.3	34.9	11.446	6.66	11.32	1363.
38.	.01432	1.0212	.8114	-142.6	57.9	12.069	6.71	11.74	1336.
40.	.01466	.9529	.7731	-123.5	81.8	12.682	6.74	12.14	1310.
42.	.01502	.8909	.7347	-103.9	106.4	13.283	6.77	12.51	1283.
44.	.01541	.8333	.6969	-83.8	131.8	13.874	6.80	12.89	1257.
46.	.01582	.7799	.6598	-63.9	157.5	14.443	6.86	13.29	1229.
48.	.01625	.7351	.6238	-43.1	184.4	15.016	6.91	13.62	1204.
50.	.01671	.6957	.5891	-22.0	212.0	15.579	6.96	13.92	1180.
52.	.01720	.6606	.5560	-.7	240.1	16.130	7.00	14.20	1158.
56.	.01824	.6055	.4951	42.7	298.1	17.204	7.08	14.62	1118.
60.	.01937	.5657	.4416	85.9	357.2	18.223	7.15	14.91	1086.
65.	.02089	.5344	.3847	139.9	432.4	19.427	7.29	15.14	1054.
70.	.02250	.5198	.3378	193.3	508.4	20.554	7.47	15.26	1030.
75.	.02418	.5164	.2992	246.4	584.9	21.609	7.72	15.32	1012.
80.	.02589	.5221	.2676	299.2	661.6	22.600	8.02	15.37	1000.
90.	.02933	.5479	.2199	405.6	816.2	24.421	8.75	15.58	988.
100.	.03278	.5833	.1865	514.9	973.8	26.081	9.55	15.96	987.
110.	.03620	.6234	.1619	630.5	1137.3	27.637	10.43	16.49	993.
120.	.03958	.6666	.1431	750.0	1304.1	29.089	11.12	16.90	1006.
130.	.04292	.7113	.1282	873.7	1474.6	30.453	11.67	17.21	1024.
140.	.04623	.7567	.1163	1000.5	1647.7	31.736	12.07	17.42	1045.
160.	.05272	.8476	.0980	1258.9	1997.0	34.068	12.43	17.47	1092.
180.	.05909	.9381	.0849	1516.5	2343.8	36.112	12.37	17.20	1142.
200.	.06537	1.0274	.0749	1768.3	2683.4	37.900	12.10	16.77	1193.
220.	.07138	1.1089	.0672	2012.0	3011.3	39.463	11.77	16.34	1241.
240.	.07753	1.1967	.0610	2248.3	3333.8	40.866	11.45	15.94	1291.
260.	.08365	1.2837	.0559	2478.0	3649.1	42.128	11.18	15.61	1339.
280.	.08973	1.3701	.0516	2702.3	3958.5	43.275	10.97	15.35	1385.
300.	.09592	1.4620	.0479	2924.2	4267.1	44.336	10.82	15.14	1431.
350.	.11093	1.6734	.0407	3462.7	5015.7	46.643	10.58	14.84	1532.
400.	.12585	1.8830	.0354	3991.7	5753.6	48.615	10.48	14.70	1625.
450.	.14071	2.0915	.0314	4516.4	6486.4	50.342	10.45	14.64	1712.
500.	.15554	2.2993	.0282	5040.0	7217.6	51.882	10.43	14.61	1794.
550.	.17035	2.5067	.0256	5562.5	7947.4	53.273	10.44	14.60	1872.
600.	.18514	2.7137	.0234	6085.5	8677.4	54.542	10.45	14.60	1947.
700.	.21468	3.1271	.0200	7133.4	10138.9	56.796	10.50	14.64	2088.
800.	.24419	3.5401	.0175	8187.9	11606.5	58.754	10.59	14.72	2219.
900.	.27369	3.9528	.0156	9252.6	13084.3	60.493	10.71	14.84	2340.
1000.	.30317	4.3654	.0140	10330.9	14575.3	62.067	10.87	15.00	2454.
1200.	.36213	5.1903	.0117	12542.5	17612.3	64.822	11.25	15.37	2663.
1400.	.42106	6.0150	.0100	14836.0	20730.9	67.230	11.68	15.81	2853.
1600.	.47999	6.8397	.0087	17215.0	23934.9	69.346	12.10	16.22	3028.
1800.	.53893	7.6644	.0078	19679.8	27224.8	71.245	12.49	16.62	3193.
2000.	.59788	8.4891	.0070	22233.4	30603.8	73.091	12.91	17.04	3347.
2200.	.65692	9.3138	.0064	24877.1	34074.0	75.417	13.42	17.57	3492.
2400.	.71617	10.1385	.0058	27642.2	37668.6	78.027	14.12	18.30	3626.
2600.	.77588	10.9632	.0054	30578.0	41440.3	80.840	15.11	19.38	3750.
2800.	.83645	11.7880	.0050	33759.9	45470.2	83.729	16.51	20.93	3865.
3000.	.89849	12.6127	.0047	37289.7	49868.5	86.546	18.44	23.11	3973.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

14.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 17.869	83.4399	1032.3	.24187	162.8525	.00646	116.52	341.17	.00075	1.27431	1.9531
18.	83.3689	1033.9	.24110	162.1439	.00649	117.20	336.21	.00075	1.27405	1.9250
19.	82.8207	1044.6	.23561	156.7682	.00671	121.54	302.68	.00075	1.27210	1.7445
20.	82.2581	1052.9	.23071	151.4246	.00693	125.67	275.26	.00075	1.27010	1.5972
21.	81.6813	1059.2	.22626	146.1222	.00715	130.19	252.51	.00076	1.26806	1.4687
22.	81.0903	1063.9	.22214	140.8714	.00738	133.89	233.37	.00076	1.26596	1.3678
23.	80.4940	1063.1	.21902	135.2625	.00766	136.91	217.21	.00075	1.26385	1.2913
24.	79.8708	1065.2	.21544	130.1661	.00789	139.29	203.13	.00075	1.26164	1.2261
25.	79.2334	1065.7	.21197	125.0642	.00814	141.16	190.92	.00074	1.25939	1.1725
26.	78.5812	1063.8	.20856	119.7910	.00840	142.53	180.21	.00073	1.25709	1.1295
27.	77.9182	1065.5	.20518	115.3118	.00861	143.51	170.79	.00072	1.25475	1.0922
28.	77.2394	1065.2	.20185	110.7064	.00885	144.16	162.39	.00071	1.25236	1.0617
29.	76.5489	1064.3	.19865	106.2418	.00909	144.53	154.88	.00070	1.24993	1.0362
30.	75.8487	1062.5	.19578	101.9367	.00933	144.66	148.14	.00069	1.24747	1.0150
31.	75.1334	1059.9	.19284	97.6386	.00958	144.03	142.01	.00068	1.24496	1.0013
32.	74.4075	1056.2	.18990	93.3669	.00985	143.25	136.44	.00067	1.24242	.9906
33.	73.6681	1053.1	.18703	89.3878	.01010	142.34	131.33	.00065	1.23983	.9810
34.	72.9201	1049.1	.18418	85.4730	.01036	141.37	126.64	.00064	1.23722	.9732
36.	71.3871	1039.8	.17859	77.9869	.01089	139.17	118.26	.00062	1.23187	.9619
38.	69.8145	1031.4	.17314	71.2911	.01138	136.72	111.01	.00060	1.22641	.9532
40.	68.2087	1020.3	.16808	64.9973	.01189	134.12	104.65	.00058	1.22084	.9470
42.	66.5716	1010.1	.16301	59.3071	.01239	131.39	99.00	.00057	1.21518	.9429
44.	64.9100	1000.2	.15787	54.0908	.01288	128.64	93.96	.00055	1.20946	.9412
46.	63.2267	993.1	.15202	49.3116	.01338	125.91	89.42	.00054	1.20368	.9436
48.	61.5326	987.9	.14665	45.2351	.01379	123.25	85.33	.00053	1.19788	.9432
50.	59.8340	983.9	.14153	41.6279	.01415	120.69	81.64	.00052	1.19208	.9419
52.	58.1427	980.7	.13664	38.4099	.01448	118.26	78.32	.00052	1.18633	.9402
56.	54.8188	980.3	.12761	33.1922	.01492	113.87	72.69	.00051	1.17508	.9333
60.	51.6176	986.1	.11963	29.1990	.01512	110.52	68.21	.00052	1.16431	.9204
65.	47.8611	1006.8	.11034	25.5765	.01504	107.99	63.98	.00054	1.15176	.8973
70.	44.4354	1043.3	.10169	23.0981	.01462	106.25	60.99	.00056	1.14040	.8757
75.	41.3625	1093.8	.09368	21.3608	.01401	104.65	58.97	.00059	1.13027	.8634
80.	38.6321	1158.9	.08634	20.1711	.01327	104.45	57.67	.00063	1.12132	.8489
90.	34.0900	1323.5	.07375	18.6790	.01177	109.07	56.60	.00074	1.10655	.8085
100.	30.5058	1522.9	.06398	17.7952	.01048	114.91	56.76	.00085	1.09498	.7882
110.	27.6264	1753.6	.05621	17.2212	.00940	122.74	57.83	.00097	1.08575	.7768
120.	25.2655	1988.9	.05092	16.8430	.00850	129.18	58.40	.00109	1.07823	.7639
130.	23.2970	2224.1	.04715	16.5703	.00774	135.79	59.47	.00122	1.07198	.7538
140.	21.6318	2452.0	.04452	16.3678	.00710	141.86	60.85	.00136	1.06672	.7470
160.	18.9674	2865.2	.04159	16.0775	.00610	151.94	64.17	.00165	1.05833	.7380
180.	16.9222	3217.1	.04054	15.8753	.00535	159.87	67.89	.00198	1.05193	.7304
200.	15.2983	3519.1	.04045	15.7172	.00476	166.61	71.78	.00234	1.04686	.7224
220.	14.0096	3774.3	.04079	15.5346	.00433	172.84	75.75	.00272	1.04286	.7160
240.	12.8974	4030.7	.04134	15.4341	.00395	178.97	79.72	.00313	1.03941	.7100
260.	11.9548	4284.9	.04183	15.3466	.00364	185.23	83.68	.00357	1.03649	.7053
280.	11.1448	4542.4	.04221	15.2694	.00338	191.69	87.60	.00403	1.03399	.7016
300.	10.4251	4821.1	.04246	15.2420	.00314	198.37	91.48	.00452	1.03177	.6984
350.	9.0149	5502.6	.04265	15.0854	.00270	215.88	100.97	.00581	1.02743	.6940
400.	7.9461	6210.9	.04252	14.9625	.00237	234.07	110.14	.00722	1.02415	.6915
450.	7.1067	6937.2	.04224	14.8637	.00211	252.44	119.01	.00874	1.02158	.6901
500.	6.4291	7667.1	.04198	14.7826	.00191	270.69	127.61	.01038	1.01951	.6886
550.	5.8704	8402.8	.04172	14.7150	.00174	288.70	135.97	.01213	1.01780	.6875
600.	5.4014	9143.0	.04147	14.6579	.00160	306.44	144.10	.01399	1.01637	.6866
700.	4.6581	10643.5	.04097	14.5667	.00138	341.30	159.79	.01802	1.01411	.6853
800.	4.0951	12182.9	.04041	14.4973	.00121	375.81	174.81	.02244	1.01239	.6847
900.	3.6538	13772.6	.03977	14.4428	.00108	410.42	189.28	.02725	1.01105	.6844
1000.	3.2984	15420.3	.03906	14.3990	.00097	445.42	203.29	.03242	1.00997	.6844
1200.	2.7615	18891.0	.03755	14.3328	.00081	511.13	230.13	.04334	1.00834	.6922
1400.	2.3749	22588.4	.03603	14.2853	.00070	583.33	255.71	.05594	1.00717	.6930
1600.	2.0834	26430.1	.03470	14.2496	.00061	655.49	280.23	.06982	1.00629	.6936
1800.	1.8555	30392.7	.03355	14.2216	.00055	727.84	303.82	.08499	1.00560	.6936
2000.	1.6726	34580.1	.03240	14.1986	.00049	804.28	326.56	.10158	1.00505	.6919
2200.	1.5223	39160.7	.03113	14.1780	.00045	891.49	344.89	.11999	1.00459	.6798
2400.	1.3963	44438.9	.02958	14.1565	.00041	1001.06	366.25	.14100	1.00421	.6697
2600.	1.2889	50862.3	.02765	14.1301	.00038	1149.87	387.19	.16576	1.00389	.6524
2800.	1.1955	59005.9	.02532	14.0929	.00035	1359.49	407.86	.19561	1.00361	.6279
3000.	1.1130	69525.3	.02273	14.0377	.00033	1654.59	428.47	.23163	1.00336	.5983

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

16.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 18.378	.01188	2.0484	1.066	-295.7	-105.7	5.295	5.28	6.71	1615.
19.	.01193	2.0171	1.066	-292.3	-101.4	5.522	5.37	6.89	1609.
20.	.01200	1.9667	1.065	-286.4	-94.4	5.883	5.51	7.17	1600.
21.	.01208	1.9163	1.062	-280.4	-87.1	6.239	5.64	7.44	1591.
22.	.01217	1.8661	1.058	-274.2	-79.5	6.591	5.75	7.70	1581.
23.	.01225	1.8161	1.052	-267.7	-71.7	6.940	5.86	7.96	1571.
24.	.01234	1.7664	1.045	-261.0	-63.6	7.284	5.96	8.22	1561.
25.	.01243	1.7119	1.041	-254.1	-55.3	7.624	6.05	8.49	1550.
26.	.01253	1.6642	1.031	-247.1	-46.7	7.961	6.13	8.74	1540.
27.	.01262	1.6158	1.020	-239.8	-37.8	8.296	6.21	8.98	1528.
28.	.01273	1.5644	1.007	-232.3	-28.7	8.627	6.28	9.22	1515.
29.	.01283	1.5218	.9937	-224.7	-19.4	8.954	6.35	9.45	1505.
30.	.01294	1.4775	.9796	-216.9	-9.8	9.278	6.41	9.67	1493.
31.	.01306	1.4313	.9650	-208.9	-.0	9.599	6.46	9.90	1481.
32.	.01317	1.3906	.9504	-200.8	10.0	9.917	6.52	10.12	1470.
33.	.01329	1.3492	.9351	-192.4	20.2	10.232	6.56	10.34	1458.
34.	.01342	1.3072	.9192	-184.0	30.7	10.544	6.61	10.56	1446.
36.	.01368	1.2299	.8857	-166.6	52.2	11.159	6.68	10.98	1421.
38.	.01396	1.1571	.8508	-148.7	74.6	11.764	6.74	11.37	1397.
40.	.01425	1.0890	.8151	-130.3	97.7	12.356	6.78	11.73	1373.
42.	.01456	1.0265	.7789	-111.5	121.5	12.937	6.81	12.07	1349.
44.	.01490	.9676	.7429	-92.4	146.0	13.506	6.84	12.41	1325.
46.	.01525	.9144	.7075	-73.3	170.6	14.054	6.91	12.76	1300.
48.	.01562	.8633	.6729	-53.4	196.5	14.604	6.96	13.10	1275.
50.	.01601	.8176	.6391	-33.1	223.0	15.144	7.01	13.40	1251.
52.	.01641	.7824	.6068	-12.6	250.0	15.675	7.05	13.64	1230.
56.	.01729	.7195	.5463	29.2	305.7	16.708	7.13	14.07	1192.
60.	.01823	.6719	.4922	71.0	362.7	17.690	7.20	14.39	1159.
65.	.01949	.6301	.4336	123.6	435.5	18.855	7.34	14.70	1124.
70.	.02083	.6056	.3840	176.2	509.6	19.953	7.53	14.93	1096.
75.	.02224	.5943	.3425	228.8	584.6	20.988	7.78	15.09	1074.
80.	.02368	.5913	.3076	281.6	660.5	21.967	8.08	15.25	1057.
90.	.02663	.6071	.2539	388.5	814.5	23.781	8.79	15.57	1037.
100.	.02959	.6361	.2155	498.7	972.2	25.443	9.59	15.99	1030.
110.	.03255	.6715	.1872	615.3	1136.1	27.004	10.46	16.55	1030.
120.	.03550	.7105	.1654	735.7	1303.7	28.461	11.16	16.98	1040.
130.	.03842	.7528	.1482	860.3	1475.0	29.833	11.71	17.30	1055.
140.	.04131	.7966	.1342	988.1	1649.0	31.122	12.10	17.51	1073.
160.	.04700	.8856	.1130	1248.1	2000.2	33.466	12.46	17.56	1117.
180.	.05259	.9744	.0977	1507.3	2348.8	35.520	12.41	17.28	1165.
200.	.05810	1.0633	.0861	1760.3	2689.9	37.317	12.14	16.84	1215.
220.	.06353	1.1504	.0770	2005.3	3021.7	38.899	11.79	16.37	1264.
240.	.06875	1.2299	.0700	2242.0	3341.9	40.292	11.47	15.98	1309.
260.	.07411	1.3170	.0641	2472.2	3658.0	41.558	11.20	15.66	1357.
280.	.07945	1.4035	.0592	2697.1	3968.2	42.707	10.98	15.39	1402.
300.	.08491	1.4973	.0548	2919.8	4278.4	43.772	10.83	15.18	1448.
350.	.09806	1.7085	.0466	3459.3	5028.3	46.083	10.59	14.86	1548.
400.	.11113	1.9180	.0405	3989.1	5767.2	48.058	10.49	14.71	1640.
450.	.12415	2.1264	.0359	4514.3	6500.6	49.787	10.45	14.65	1726.
500.	.13713	2.3341	.0322	5038.4	7232.4	51.328	10.44	14.62	1808.
550.	.15009	2.5413	.0292	5561.2	7962.6	52.720	10.44	14.60	1885.
600.	.16303	2.7482	.0268	6084.5	8693.0	53.989	10.45	14.61	1960.
700.	.18889	3.1614	.0229	7132.7	10154.9	56.244	10.50	14.64	2100.
800.	.21471	3.5742	.0200	8187.5	11622.9	58.203	10.59	14.72	2229.
900.	.24052	3.9867	.0178	9252.4	13100.8	59.942	10.71	14.84	2350.
1000.	.26632	4.3991	.0160	10330.8	14592.0	61.516	10.87	15.00	2464.
1200.	.31791	5.2237	.0133	12542.7	17629.2	64.271	11.25	15.38	2672.
1400.	.36948	6.0483	.0114	14836.3	20748.0	66.679	11.68	15.81	2860.
1600.	.42104	6.8728	.0100	17215.3	23952.0	68.795	12.10	16.22	3036.
1800.	.47261	7.6974	.0089	19680.0	27241.8	70.695	12.49	16.61	3200.
2000.	.52419	8.5219	.0080	22232.9	30620.0	72.540	12.91	17.04	3354.
2200.	.57584	9.3465	.0073	24874.3	34087.8	74.865	13.40	17.55	3498.
2400.	.62767	10.1712	.0067	27633.2	37676.0	77.472	14.07	18.26	3632.
2600.	.67987	10.9958	.0062	30555.8	41433.7	80.279	15.02	19.28	3757.
2800.	.73278	11.8205	.0057	33711.9	45436.4	83.158	16.35	20.75	3872.
3000.	.78689	12.6451	.0053	37196.8	49787.0	85.959	18.18	22.80	3981.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

16.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 18.378	84.1703	1085.8	.24014	172.4170	.00618	121.39	353.30	.00077	1.27691	1.9543
19.	83.8438	1093.2	.23686	169.1204	.00630	124.11	330.57	.00077	1.27574	1.8357
20.	83.3088	1103.2	.23204	163.8434	.00650	128.51	299.59	.00077	1.27384	1.6714
21.	82.7610	1111.2	.22767	158.5978	.00670	133.30	273.99	.00078	1.27189	1.5293
22.	82.2006	1117.5	.22362	153.3933	.00689	137.24	252.55	.00078	1.26990	1.4178
23.	81.6276	1122.3	.21989	148.2402	.00710	140.47	234.38	.00078	1.26787	1.3287
24.	81.0422	1125.8	.21637	143.1502	.00730	143.08	218.82	.00077	1.26579	1.2567
25.	80.4488	1123.8	.21388	137.7178	.00756	145.17	205.41	.00076	1.26369	1.2016
26.	79.8365	1126.0	.21059	132.8603	.00776	146.73	193.63	.00076	1.26152	1.1529
27.	79.2100	1127.0	.20728	127.9866	.00797	147.88	183.25	.00075	1.25931	1.1125
28.	78.5728	1125.7	.20401	122.9176	.00819	148.69	174.06	.00074	1.25706	1.0796
29.	77.9254	1127.5	.20084	118.5883	.00838	149.22	165.88	.00073	1.25478	1.0503
30.	77.2670	1127.1	.19786	114.1641	.00858	149.50	158.54	.00072	1.25246	1.0257
31.	76.5983	1125.0	.19488	109.6379	.00880	148.99	151.91	.00071	1.25011	1.0096
32.	75.9211	1124.5	.19209	105.5769	.00900	148.33	145.91	.00069	1.24773	.9958
33.	75.2309	1122.6	.18937	101.4992	.00921	147.53	140.41	.00068	1.24530	.9843
34.	74.5334	1119.6	.18667	97.4322	.00943	146.67	135.39	.00067	1.24286	.9750
36.	73.1104	1114.4	.18132	89.9185	.00985	144.69	126.48	.00065	1.23788	.9596
38.	71.6542	1108.0	.17618	82.9097	.01026	142.43	118.81	.00063	1.23280	.9485
40.	70.1694	1099.9	.17144	76.4173	.01067	140.01	112.12	.00061	1.22764	.9394
42.	68.6604	1092.3	.16668	70.4825	.01105	137.46	106.22	.00060	1.22240	.9329
44.	67.1339	1084.9	.16182	64.9599	.01144	134.87	100.98	.00058	1.21712	.9290
46.	65.5916	1081.6	.15618	59.9771	.01180	132.29	96.27	.00057	1.21180	.9285
48.	64.0397	1076.0	.15100	55.2845	.01217	129.77	92.03	.00056	1.20647	.9289
50.	62.4792	1071.4	.14602	51.0822	.01251	127.31	88.19	.00055	1.20112	.9286
52.	60.9229	1071.7	.14129	47.6678	.01273	124.96	84.72	.00054	1.19580	.9249
56.	57.8466	1072.1	.13244	41.6200	.01313	120.65	78.75	.00053	1.18532	.9185
60.	54.8590	1077.9	.12455	36.8625	.01335	117.10	73.92	.00053	1.17521	.9085
65.	51.3040	1096.4	.11516	32.3268	.01341	114.40	69.21	.00055	1.16326	.8896
70.	47.9986	1129.9	.10628	29.0695	.01321	112.50	65.71	.00057	1.15222	.8718
75.	44.9729	1177.9	.09793	26.7252	.01281	110.83	63.20	.00059	1.14217	.8607
80.	42.2333	1238.2	.09021	24.9716	.01232	110.30	61.47	.00062	1.13313	.8500
90.	37.5586	1398.2	.07687	22.8006	.01114	114.43	59.66	.00070	1.11782	.8118
100.	33.7906	1594.7	.06648	21.4951	.01003	119.79	59.30	.00080	1.10558	.7915
110.	30.7187	1823.2	.05824	20.6272	.00907	127.79	60.36	.00091	1.09567	.7815
120.	28.1711	2054.6	.05263	20.0154	.00826	133.65	60.59	.00101	1.08750	.7698
130.	26.0308	2288.1	.04863	19.5956	.00756	139.81	61.37	.00112	1.08066	.7596
140.	24.2091	2515.4	.04581	19.2857	.00696	145.49	62.52	.00124	1.07487	.7522
160.	21.2755	2927.2	.04263	18.8405	.00600	154.89	65.48	.00149	1.06559	.7424
180.	19.0141	3277.5	.04142	18.5275	.00527	162.27	68.95	.00178	1.05848	.7344
200.	17.2120	3580.3	.04121	18.3010	.00470	168.56	72.66	.00209	1.05283	.7260
220.	15.7408	3849.9	.04148	18.1087	.00425	174.45	76.49	.00244	1.04824	.7179
240.	14.5460	4086.3	.04195	17.8896	.00391	180.32	80.35	.00279	1.04452	.7123
260.	13.4930	4338.7	.04244	17.7700	.00361	186.37	84.24	.00318	1.04125	.7076
280.	12.5871	4596.3	.04278	17.6655	.00335	192.66	88.10	.00358	1.03845	.7037
300.	11.7769	4879.4	.04300	17.6334	.00311	199.21	91.92	.00401	1.03594	.7003
350.	10.1977	5561.1	.04311	17.4229	.00267	216.49	101.31	.00514	1.03107	.6954
400.	8.9985	6269.8	.04291	17.2590	.00235	234.54	110. .	.00638	1.02738	.6926
450.	8.0551	6996.5	.04259	17.1280	.00209	252.82	119.24	.00771	1.02448	.6910
500.	7.2924	7726.6	.04229	17.0209	.00189	271.00	127.81	.00915	1.02215	.6893
550.	6.6628	8462.5	.04200	16.9319	.00173	288.96	136.14	.01069	1.02022	.6880
600.	6.1338	9203.0	.04173	16.8568	.00159	306.66	144.25	.01232	1.01860	.6870
700.	5.2942	10703.9	.04118	16.7372	.00137	341.48	159.90	.01586	1.01604	.6856
800.	4.6574	12243.7	.04059	16.6464	.00120	375.95	174.91	.01974	1.01410	.6849
900.	4.1576	13833.9	.03993	16.5752	.00107	410.54	189.36	.02395	1.01258	.6846
1000.	3.7548	15482.3	.03920	16.5179	.00097	445.52	203.36	.02848	1.01136	.6845
1200.	3.1456	18954.4	.03766	16.4316	.00081	511.13	230.19	.03805	1.00951	.6924
1400.	2.7065	22653.4	.03612	16.3698	.00070	583.32	255.75	.04908	1.00818	.6931
1600.	2.3751	26496.2	.03478	16.3233	.00061	655.47	280.26	.06124	1.00717	.6937
1800.	2.1159	30457.5	.03362	16.2870	.00055	727.71	303.85	.07452	1.00639	.6937
2000.	1.9077	34636.1	.03248	16.2573	.00049	803.76	326.58	.08904	1.00576	.6922
2200.	1.7366	39189.0	.03123	16.2310	.00045	889.84	344.89	.10511	1.00524	.6802
2400.	1.5932	44400.7	.02972	16.2047	.00041	996.83	366.24	.12337	1.00481	.6708
2600.	1.4709	50689.8	.02785	16.1734	.00038	1140.49	387.17	.14480	1.00444	.6544
2800.	1.3647	58594.6	.02560	16.1310	.00035	1341.02	407.82	.17051	1.00412	.6309
3000.	1.2708	68730.0	.02308	16.0698	.00033	1621.58	428.38	.20147	1.00383	.6023

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

18.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 18.874	.01178	2.1426	1.080	-293.4	-81.3	5.332	5.33	6.76	1648.
19.	.01179	2.1364	1.080	-292.7	-80.5	5.377	5.35	6.79	1647.
20.	.01186	2.0875	1.080	-287.1	-73.5	5.732	5.49	7.06	1639.
21.	.01194	2.0386	1.078	-281.2	-66.3	6.083	5.62	7.32	1630.
22.	.01201	1.9897	1.075	-275.1	-58.9	6.430	5.74	7.58	1621.
23.	.01209	1.9409	1.070	-268.9	-51.2	6.772	5.85	7.83	1612.
24.	.01217	1.8923	1.064	-262.4	-43.2	7.111	5.95	8.07	1603.
25.	.01226	1.8441	1.057	-255.7	-35.0	7.445	6.04	8.31	1593.
26.	.01235	1.7964	1.049	-248.9	-26.6	7.776	6.12	8.55	1584.
27.	.01244	1.7451	1.043	-241.8	-17.9	8.103	6.20	8.81	1574.
28.	.01253	1.7001	1.032	-234.6	-9.0	8.427	6.28	9.04	1564.
29.	.01263	1.6542	1.020	-227.2	.1	8.749	6.35	9.26	1553.
30.	.01273	1.6057	1.007	-219.6	9.5	9.066	6.41	9.48	1541.
31.	.01283	1.5650	.9933	-211.9	19.1	9.380	6.47	9.69	1531.
32.	.01294	1.5226	.9789	-204.0	28.9	9.691	6.52	9.90	1520.
33.	.01305	1.4806	.9642	-196.0	38.9	9.999	6.57	10.10	1508.
34.	.01316	1.4380	.9496	-187.8	49.1	10.303	6.62	10.31	1497.
36.	.01339	1.3617	.9186	-171.0	70.1	10.904	6.70	10.70	1475.
38.	.01364	1.2873	.8859	-153.7	91.9	11.493	6.76	11.08	1452.
40.	.01391	1.2192	.8523	-136.0	114.4	12.070	6.80	11.41	1430.
42.	.01419	1.1548	.8181	-117.8	137.5	12.634	6.84	11.74	1408.
44.	.01448	1.0969	.7838	-99.3	161.3	13.187	6.87	12.04	1386.
46.	.01478	1.0427	.7499	-81.0	185.2	13.718	6.94	12.37	1363.
48.	.01511	.9914	.7165	-61.7	210.2	14.250	7.00	12.67	1340.
50.	.01544	.9454	.6840	-42.2	235.8	14.773	7.05	12.95	1318.
52.	.01580	.9019	.6523	-22.4	262.0	15.286	7.09	13.22	1296.
56.	.01655	.8327	.5924	18.1	316.0	16.287	7.18	13.64	1258.
60.	.01735	.7794	.5381	58.9	371.3	17.240	7.25	13.97	1225.
65.	.01843	.7289	.4784	110.2	442.0	18.373	7.39	14.32	1189.
70.	.01958	.6962	.4270	161.9	514.3	19.444	7.58	14.61	1158.
75.	.02078	.6762	.3832	214.0	588.0	20.460	7.82	14.86	1133.
80.	.02202	.6677	.3459	266.5	662.8	21.426	8.12	15.07	1113.
90.	.02457	.6711	.2872	373.5	815.8	23.228	8.84	15.52	1085.
100.	.02717	.6927	.2442	484.3	973.3	24.887	9.64	15.99	1072.
110.	.02977	.7235	.2122	601.5	1137.4	26.450	10.50	16.57	1069.
120.	.03237	.7587	.1876	722.7	1305.3	27.910	11.19	17.02	1074.
130.	.03495	.7979	.1681	848.0	1477.1	29.286	11.74	17.36	1086.
140.	.03751	.8391	.1523	976.6	1651.8	30.580	12.14	17.58	1102.
160.	.04258	.9252	.1281	1238.1	2004.5	32.934	12.49	17.64	1143.
180.	.04756	1.0128	.1106	1498.5	2354.6	34.997	12.44	17.35	1189.
200.	.05246	1.1000	.0974	1752.8	2697.1	36.801	12.17	16.91	1236.
220.	.05730	1.1874	.0870	1998.8	3030.2	38.389	11.83	16.43	1284.
240.	.06208	1.2728	.0786	2236.6	3354.1	39.798	11.50	15.99	1331.
260.	.06670	1.3507	.0720	2467.0	3667.6	41.054	11.22	15.66	1373.
280.	.07145	1.4373	.0667	2692.1	3978.3	42.205	11.00	15.43	1420.
300.	.07635	1.5332	.0618	2915.5	4289.9	43.274	10.85	15.21	1466.
350.	.08806	1.7441	.0524	3456.1	5041.1	45.589	10.60	14.88	1565.
400.	.09968	1.9533	.0456	3986.6	5780.9	47.566	10.50	14.73	1655.
450.	.11126	2.1615	.0404	4512.4	6515.0	49.297	10.46	14.66	1740.
500.	.12281	2.3690	.0362	5036.8	7247.3	50.839	10.45	14.62	1821.
550.	.13433	2.5760	.0329	5560.0	7977.9	52.231	10.45	14.61	1898.
600.	.14584	2.7827	.0301	6083.5	8708.6	53.501	10.45	14.61	1972.
700.	.16882	3.1956	.0258	7132.2	10170.9	55.757	10.50	14.65	2111.
800.	.19178	3.6082	.0225	8187.2	11639.2	57.716	10.59	14.72	2240.
900.	.21472	4.0205	.0200	9252.3	13117.4	59.456	10.71	14.84	2360.
1000.	.23766	4.4327	.0180	10330.9	14608.7	61.030	10.87	15.00	2473.
1200.	.28351	5.2570	.0150	12543.0	17646.1	63.785	11.25	15.38	2680
1400.	.32935	6.0812	.0128	14836.7	20765.0	66.193	11.69	15.81	2868.
1600.	.37518	6.9056	.0112	17215.8	23969.1	68.309	12.10	16.22	3043.
1800.	.42102	7.7300	.0100	19680.4	27258.7	70.209	12.49	16.61	3207.
2000.	.46687	8.5544	.0090	22232.7	30636.3	72.054	12.90	17.03	3360.
2200.	.51278	9.3789	.0082	24872.1	34102.1	74.378	13.39	17.53	3504.
2400.	.55883	10.2034	.0075	27626.1	37685.0	76.982	14.04	18.22	3639.
2600.	.60520	11.0280	.0069	30537.6	41431.1	79.785	14.95	19.20	3763.
2800.	.65216	11.8525	.0064	33672.4	45411.3	82.655	16.22	20.60	3879.
3000.	.70014	12.6772	.0060	37119.9	49722.4	85.443	17.95	22.55	3989.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

18.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 18.874	84.8704	1137.7	.23871	181.8403	.00594	126.03	365.44	.00079	1.27940	1.9595
19.	84.8070	1139.4	.23807	181.1834	.00596	126.57	360.52	.00079	1.27918	1.9347
20.	84.2955	1151.0	.23330	175.9684	.00614	131.23	325.55	.00079	1.27735	1.7520
21.	83.7725	1160.5	.22897	170.7764	.00631	136.27	296.78	.00080	1.27549	1.5953
22.	83.2381	1168.4	.22497	165.6158	.00649	140.45	272.79	.00080	1.27359	1.4725
23.	82.6924	1174.6	.22129	160.4964	.00667	143.88	252.54	.00080	1.27165	1.3744
24.	82.1357	1179.6	.21783	155.4285	.00685	146.69	235.26	.00080	1.26967	1.2951
25.	81.5680	1183.3	.21458	150.4231	.00703	148.95	220.37	.00079	1.26765	1.2300
26.	80.9895	1186.2	.21145	145.4917	.00721	150.69	207.42	.00078	1.26560	1.1769
27.	80.4001	1184.7	.20915	140.3040	.00744	152.01	196.07	.00077	1.26352	1.1362
28.	79.7998	1187.5	.20598	135.6647	.00761	152.98	186.04	.00076	1.26139	1.0988
29.	79.1848	1188.9	.20288	130.9868	.00779	153.64	177.07	.00075	1.25922	1.0670
30.	78.5637	1187.5	.19997	126.1467	.00798	154.05	169.09	.00074	1.25703	1.0405
31.	77.9345	1189.4	.19701	121.9677	.00814	153.66	161.92	.00073	1.25481	1.0207
32.	77.2941	1189.6	.19413	117.6904	.00832	153.09	155.41	.00072	1.25255	1.0045
33.	76.6465	1188.8	.19138	113.4830	.00850	152.39	149.50	.00071	1.25027	.9909
34.	75.9926	1186.6	.18878	109.2805	.00869	151.63	144.12	.00070	1.24798	.9800
36.	74.6560	1184.3	.18368	101.6578	.00904	149.82	134.59	.00068	1.24329	.9614
38.	73.2918	1179.5	.17874	94.3467	.00939	147.72	126.45	.00066	1.23852	.9480
40.	71.9051	1173.9	.17423	87.6682	.00972	145.45	119.39	.00064	1.23368	.9367
42.	70.4961	1167.8	.16972	81.4092	.01005	143.03	113.19	.00062	1.22877	.9287
44.	69.0729	1163.7	.16510	75.7670	.01035	140.56	107.70	.00061	1.22383	.9225
46.	67.6380	1163.0	.15967	70.5258	.01063	138.09	102.80	.00059	1.21887	.9205
48.	66.1964	1160.5	.15468	65.6252	.01092	135.66	98.39	.00058	1.21389	.9190
50.	64.7504	1158.9	.14988	61.2150	.01117	133.30	94.41	.00057	1.20891	.9171
52.	63.3028	1156.8	.14524	57.0946	.01142	131.01	90.79	.00056	1.20394	.9158
56.	60.4295	1158.8	.13655	50.3192	.01177	126.78	84.53	.00055	1.19411	.9096
60.	57.6214	1165.7	.12873	44.9082	.01198	123.23	79.38	.00055	1.18456	.8998
65.	54.2514	1183.9	.11935	39.5450	.01210	120.30	74.26	.00056	1.17316	.8840
70.	51.0762	1216.2	.11033	35.5587	.01201	118.25	70.34	.00057	1.16250	.8689
75.	48.1267	1261.7	.10175	32.5426	.01177	116.58	67.41	.00059	1.15264	.8591
80.	45.4163	1321.5	.09375	30.3250	.01141	115.80	65.28	.00061	1.14364	.8497
90.	40.6944	1475.8	.07982	27.3084	.01052	119.55	62.78	.00068	1.12807	.8151
100.	36.8044	1669.4	.06887	25.4928	.00958	124.51	61.89	.00076	1.11536	.7950
110.	33.5890	1897.3	.06018	24.3021	.00873	132.66	62.84	.00086	1.10492	.7849
120.	30.8955	2126.8	.05427	23.4407	.00800	138.01	62.77	.00094	1.09624	.7743
130.	28.6125	2358.2	.05005	22.8313	.00736	143.79	63.29	.00104	1.08891	.7643
140.	26.6567	2582.5	.04707	22.3681	.00681	149.13	64.22	.00115	1.08266	.7570
160.	23.4862	2992.0	.04366	21.7295	.00590	157.92	66.84	.00137	1.07258	.7466
180.	21.0273	3341.9	.04229	21.2970	.00519	164.76	70.06	.00163	1.06481	.7380
200.	19.0621	3642.5	.04197	20.9689	.00464	170.62	73.59	.00191	1.05863	.7294
220.	17.4520	3914.2	.04214	20.7219	.00420	176.16	77.28	.00221	1.05359	.7209
240.	16.1070	4169.2	.04246	20.5002	.00384	181.75	81.04	.00254	1.04938	.7132
260.	14.9925	4404.1	.04280	20.2510	.00355	187.58	84.83	.00288	1.04591	.7080
280.	13.9953	4650.8	.04334	20.1147	.00332	193.70	88.62	.00323	1.04281	.7058
300.	13.0969	4938.7	.04353	20.0796	.00308	200.11	92.39	.00362	1.04002	.7021
350.	11.3563	5620.3	.04356	19.8062	.00265	217.14	101.67	.00463	1.03464	.6968
400.	10.0318	6329.1	.04330	19.5952	.00233	235.04	110.71	.00573	1.03056	.6937
450.	8.9880	7056.1	.04293	19.4272	.00208	253.21	119.48	.00692	1.02735	.6918
500.	8.1430	7786.4	.04260	19.2904	.00188	271.33	128.01	.00820	1.02475	.6900
550.	7.4445	8522.5	.04227	19.1769	.00171	289.23	136.31	.00957	1.02261	.6886
600.	6.8570	9263.1	.04197	19.0812	.00158	306.90	144.40	.01103	1.02081	.6875
700.	5.9234	10764.3	.04139	18.9292	.00136	341.66	160.03	.01418	1.01796	.6860
800.	5.2143	12304.5	.04077	18.8141	.00120	376.10	175.01	.01763	1.01580	.6852
900.	4.6572	13895.1	.04009	18.7239	.00107	410.66	189.45	.02139	1.01410	.6848
1000.	4.2077	15544.1	.03934	18.6515	.00096	445.63	203.43	.02542	1.01274	.6846
1200.	3.5272	19017.6	.03777	18.5425	.00081	511.13	230.24	.03393	1.01067	.6926
1400.	3.0363	22718.2	.03621	18.4645	.00070	583.32	255.80	.04375	1.00918	.6932
1600.	2.6654	26562.1	.03485	18.4059	.00061	655.45	280.30	.05457	1.00805	.6938
1800.	2.3752	30522.5	.03369	18.3602	.00054	727.61	303.88	.06638	1.00717	.6938
2000.	2.1419	34694.0	.03255	18.3229	.00049	803.32	326.61	.07928	1.00647	.6924
2200.	1.9502	39224.2	.03131	18.2904	.00045	888.48	344.89	.09354	1.00589	.6806
2400.	1.7895	44381.1	.02983	18.2585	.00041	993.32	366.24	.10969	1.00540	.6717
2600.	1.6524	50559.1	.02802	18.2221	.00038	1132.71	387.16	.12855	1.00499	.6562
2800.	1.5334	58266.3	.02584	18.1743	.00035	1325.72	407.79	.15111	1.00463	.6336
3000.	1.4283	68083.8	.02339	18.1067	.00033	1594.22	428.31	.17820	1.00431	.6058

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

20.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 19.360	.01169	2.2344	1.094	-291.0	-57.2	5.367	5.38	6.80	1680.
20.	.01173	2.2040	1.094	-287.4	-52.8	5.591	5.47	6.97	1675.
21.	.01180	2.1564	1.093	-281.7	-45.7	5.937	5.60	7.22	1667.
22.	.01187	2.1087	1.090	-275.8	-38.3	6.279	5.72	7.47	1659.
23.	.01195	2.0611	1.087	-269.7	-30.7	6.616	5.83	7.71	1651.
24.	.01203	2.0136	1.082	-263.4	-22.9	6.950	5.93	7.95	1642.
25.	.01210	1.9664	1.075	-256.9	-14.8	7.279	6.03	8.18	1634.
26.	.01219	1.9195	1.068	-250.2	-6.5	7.604	6.11	8.41	1625.
27.	.01227	1.8731	1.060	-243.4	2.0	7.926	6.20	8.63	1615.
28.	.01236	1.8274	1.051	-236.4	10.7	8.244	6.28	8.86	1606.
29.	.01245	1.7797	1.044	-229.2	19.7	8.560	6.35	9.10	1597.
30.	.01254	1.7369	1.032	-221.8	28.9	8.872	6.41	9.30	1588.
31.	.01263	1.6937	1.019	-214.3	38.3	9.180	6.47	9.51	1577.
32.	.01273	1.6480	1.006	-206.7	47.9	9.485	6.53	9.71	1566.
33.	.01283	1.6088	.9921	-198.8	57.8	9.787	6.58	9.90	1556.
34.	.01293	1.5685	.9777	-190.9	67.7	10.085	6.63	10.09	1546.
36.	.01315	1.4861	.9483	-174.6	88.3	10.673	6.71	10.48	1523.
38.	.01337	1.4146	.9177	-157.8	109.6	11.249	6.78	10.83	1503.
40.	.01361	1.3444	.8859	-140.6	131.6	11.813	6.83	11.15	1482.
42.	.01386	1.2803	.8533	-123.0	154.2	12.364	6.86	11.45	1462.
44.	.01412	1.2210	.8206	-105.1	177.4	12.904	6.90	11.74	1441.
46.	.01440	1.1649	.7880	-87.3	200.7	13.421	6.98	12.06	1419.
48.	.01468	1.1145	.7558	-68.6	225.1	13.940	7.03	12.34	1398.
50.	.01498	1.0671	.7242	-49.6	250.0	14.449	7.09	12.60	1378.
52.	.01529	1.0229	.6935	-30.4	275.5	14.948	7.13	12.85	1358.
56.	.01595	.9463	.6346	9.0	328.1	15.923	7.22	13.29	1319.
60.	.01666	.8863	.5803	48.8	381.9	16.851	7.30	13.63	1286.
65.	.01760	.8298	.5197	99.0	451.0	17.957	7.44	13.99	1249.
70.	.01860	.7893	.4671	149.9	521.8	19.006	7.62	14.32	1217.
75.	.01964	.7626	.4216	201.3	594.1	20.004	7.87	14.62	1190.
80.	.02073	.7461	.3823	253.4	667.9	20.956	8.17	14.90	1167.
90.	.02297	.7396	.3195	360.2	819.6	22.742	8.89	15.44	1134.
100.	.02527	.7532	.2725	471.3	976.7	24.397	9.68	15.97	1115.
110.	.02758	.7787	.2370	589.1	1140.7	25.959	10.54	16.57	1107.
120.	.02990	.8101	.2096	710.7	1308.7	27.421	11.22	17.04	1109.
130.	.03221	.8451	.1879	836.7	1480.9	28.799	11.77	17.40	1118.
140.	.03451	.8842	.1702	965.9	1656.0	30.096	12.17	17.63	1132.
160.	.03906	.9669	.1432	1228.6	2009.8	32.458	12.52	17.70	1169.
180.	.04355	1.0521	.1235	1490.2	2361.1	34.528	12.47	17.42	1212.
200.	.04796	1.1390	.1087	1745.6	2704.9	36.339	12.20	16.97	1259.
220.	.05233	1.2245	.0970	1992.7	3039.2	37.932	11.86	16.49	1305.
240.	.05664	1.3105	.0876	2231.4	3364.3	39.347	11.53	16.05	1350.
260.	.06091	1.3950	.0800	2462.8	3681.0	40.615	11.25	15.67	1394.
280.	.06514	1.4793	.0735	2688.2	3991.0	41.764	11.02	15.36	1436.
300.	.06951	1.5696	.0688	2911.4	4301.6	42.828	10.86	15.24	1484.
350.	.08005	1.7800	.0583	3453.0	5054.1	45.147	10.61	14.90	1581.
400.	.09053	1.9889	.0507	3984.2	5794.8	47.126	10.51	14.74	1671.
450.	.10095	2.1968	.0449	4510.5	6529.5	48.858	10.47	14.67	1755.
500.	.11135	2.4040	.0403	5035.4	7262.3	50.401	10.45	14.63	1835.
550.	.12172	2.6108	.0365	5558.9	7993.3	51.795	10.45	14.62	1911.
600.	.13208	2.8173	.0334	6082.7	8724.2	53.065	10.46	14.62	1984.
700.	.15277	3.2299	.0286	7131.7	10187.0	55.321	10.51	14.65	2122.
800.	.17343	3.6420	.0250	8187.0	11655.6	57.281	10.59	14.73	2250.
900.	.19408	4.0541	.0222	9252.3	13133.9	59.021	10.72	14.85	2370.
1000.	.21472	4.4660	.0200	10331.0	14625.4	60.595	10.87	15.00	2482.
1200.	.25599	5.2899	.0167	12543.3	17663.0	63.351	11.25	15.38	2688.
1400.	.29724	6.1139	.0143	14837.2	20781.9	65.758	11.69	15.81	2876.
1600.	.33849	6.9380	.0125	17216.3	23986.1	67.875	12.10	16.22	3050.
1800.	.37974	7.7622	.0111	19680.9	27275.7	69.774	12.49	16.61	3213.
2000.	.42100	8.5865	.0100	22232.7	30652.7	71.619	12.90	17.02	3367.
2200.	.46231	9.4108	.0091	24870.5	34116.7	73.942	13.38	17.52	3511.
2400.	.50375	10.2352	.0083	27620.2	37695.2	76.545	14.01	18.19	3645.
2600.	.54546	11.0597	.0077	30522.3	41431.5	79.343	14.88	19.13	3770.
2800.	.58767	11.8842	.0071	33639.2	45392.7	82.207	16.10	20.47	3886.
3000.	.63076	12.7087	.0067	37055.1	49670.3	84.983	17.77	22.33	3996.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

20.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 19.360	85.5433	1188.4	.23748	191.1415	.00572	130.46	377.62	.00081	1.28181	1.9680
20.	85.2277	1196.5	.23452	187.8410	.00582	133.83	353.32	.00081	1.28068	1.8393
21.	84.7262	1207.5	.23021	182.7004	.00598	139.12	321.04	.00082	1.27889	1.6668
22.	84.2142	1216.9	.22624	177.5827	.00614	143.52	294.22	.00082	1.27706	1.5318
23.	83.6921	1224.6	.22258	172.4970	.00630	147.16	271.67	.00082	1.27520	1.4241
24.	83.1599	1231.0	.21916	167.4527	.00646	150.15	252.50	.00082	1.27331	1.3370
25.	82.6179	1236.0	.21594	162.4598	.00662	152.58	236.03	.00081	1.27138	1.2657
26.	82.0662	1240.2	.21286	157.5289	.00678	154.47	221.76	.00081	1.26942	1.2072
27.	81.5050	1243.8	.20984	152.6707	.00694	155.94	209.29	.00080	1.26743	1.1589
28.	80.9346	1246.8	.20687	147.8964	.00710	157.06	198.32	.00079	1.26541	1.1185
29.	80.3501	1246.2	.20469	142.9995	.00730	157.84	188.54	.00078	1.26334	1.0868
30.	79.7603	1248.6	.20186	138.5345	.00745	158.37	179.85	.00077	1.26125	1.0564
31.	79.1617	1250.3	.19899	134.0749	.00760	158.07	172.05	.00076	1.25914	1.0348
32.	78.5555	1249.9	.19617	129.4586	.00777	157.59	165.02	.00074	1.25700	1.0172
33.	77.9422	1251.7	.19344	125.3964	.00791	156.98	158.66	.00073	1.25484	1.0009
34.	77.3220	1252.1	.19078	121.2815	.00806	156.30	152.86	.00072	1.25265	.9871
36.	76.0619	1249.0	.18574	113.0376	.00839	154.64	142.68	.00070	1.24822	.9667
38.	74.7739	1247.9	.18099	105.7719	.00868	152.68	134.00	.00068	1.24370	.9503
40.	73.4653	1243.3	.17665	98.7645	.00897	150.53	126.52	.00066	1.23912	.9374
42.	72.1398	1239.8	.17232	92.3572	.00924	148.21	119.99	.00065	1.23450	.9274
44.	70.8011	1237.3	.16788	86.4488	.00949	145.83	114.23	.00063	1.22984	.9200
46.	69.4518	1238.2	.16263	80.9077	.00974	143.45	109.10	.00062	1.22515	.9172
48.	68.0970	1239.0	.15780	75.8970	.00996	141.09	104.50	.00060	1.22045	.9139
50.	66.7399	1239.3	.15316	71.2198	.01017	138.79	100.35	.00059	1.21576	.9113
52.	65.3829	1239.6	.14868	66.8821	.01037	136.56	96.59	.00059	1.21109	.9091
56.	62.6829	1242.1	.14015	59.3154	.01070	132.39	90.06	.00057	1.20181	.9040
60.	60.0282	1249.4	.13241	53.2057	.01091	128.85	84.63	.00057	1.19274	.8950
65.	56.8213	1269.0	.12301	47.1485	.01102	125.90	79.15	.00057	1.18185	.8795
70.	53.7734	1300.9	.11393	42.4454	.01100	123.59	74.87	.00058	1.17155	.8673
75.	50.9103	1345.9	.10521	38.8224	.01086	121.93	71.57	.00059	1.16194	.8580
80.	48.2479	1403.2	.09699	36.0001	.01062	120.97	69.08	.00061	1.15305	.8510
90.	43.5352	1556.0	.08259	32.2001	.00992	124.43	65.95	.00067	1.13742	.8182
100.	39.5742	1747.1	.07116	29.8080	.00914	129.05	64.54	.00073	1.12440	.7988
110.	36.2537	1974.3	.06204	28.2319	.00840	137.32	65.24	.00082	1.11357	.7874
120.	33.4477	2202.9	.05584	27.0964	.00774	142.23	64.92	.00090	1.10447	.7779
130.	31.0483	2430.7	.05141	26.2402	.00716	147.70	65.21	.00098	1.09673	.7684
140.	28.9793	2654.0	.04827	25.6237	.00664	152.76	65.94	.00108	1.09008	.7609
160.	25.6015	3060.1	.04465	24.7531	.00578	161.00	68.24	.00128	1.07930	.7501
180.	22.9647	3407.2	.04314	24.1615	.00511	167.35	71.21	.00151	1.07093	.7413
200.	20.8486	3708.7	.04272	23.7458	.00458	172.78	74.56	.00176	1.06425	.7323
220.	19.1108	3978.1	.04279	23.4010	.00415	177.96	78.10	.00203	1.05878	.7237
240.	17.6549	4235.6	.04305	23.1363	.00379	183.27	81.76	.00233	1.05422	.7158
260.	16.4175	4489.0	.04328	22.9019	.00349	188.87	85.46	.00264	1.05035	.7091
280.	15.3509	4746.1	.04344	22.7079	.00324	194.80	89.17	.00297	1.04703	.7033
300.	14.3862	4998.7	.04405	22.5803	.00305	201.06	92.89	.00330	1.04403	.7038
350.	12.4914	5680.0	.04400	22.2353	.00262	217.83	102.06	.00421	1.03815	.6982
400.	11.0465	6388.9	.04368	21.9708	.00231	235.56	111.02	.00521	1.03368	.6948
450.	9.9058	7116.0	.04326	21.7611	.00206	253.63	119.74	.00628	1.03017	.6927
500.	8.9811	7846.4	.04289	21.5907	.00186	271.66	128.23	.00744	1.02732	.6917
550.	8.2157	8582.7	.04254	21.4496	.00170	289.51	136.50	.00868	1.02497	.6892
600.	7.5713	9323.4	.04222	21.3309	.00157	307.14	144.57	.00999	1.02300	.6880
700.	6.5460	10824.8	.04160	21.1426	.00135	341.85	160.16	.01283	1.01986	.6863
800.	5.7660	12365.2	.04094	21.0002	.00119	376.25	175.11	.01595	1.01748	.6854
900.	5.1525	13956.3	.04024	20.8888	.00106	410.79	189.54	.01933	1.01561	.6850
1000.	4.6572	15605.7	.03948	20.7994	.00096	445.74	203.50	.02297	1.01410	.6848
1200.	3.9065	19080.6	.03788	20.6651	.00081	511.13	230.30	.03063	1.01182	.6928
1400.	3.3643	22782.6	.03630	20.5690	.00069	583.32	255.84	.03948	1.01017	.6934
1600.	2.9543	26627.7	.03493	20.4971	.00061	655.44	280.34	.04923	1.00893	.6939
1800.	2.6334	30587.5	.03375	20.4409	.00054	727.51	303.91	.05987	1.00796	.6939
2000.	2.3753	34753.2	.03261	20.3953	.00049	802.95	326.64	.07148	1.00717	.6926
2200.	2.1630	39264.3	.03139	20.3559	.00045	887.33	344.89	.08429	1.00653	.6810
2400.	1.9851	44375.0	.02994	20.3180	.00041	990.35	366.23	.09876	1.00599	.6725
2600.	1.8333	50459.4	.02817	20.2759	.00038	1126.14	387.15	.11560	1.00553	.6576
2800.	1.7016	57999.7	.02605	20.2224	.00035	1312.77	407.76	.13567	1.00514	.6359
3000.	1.5854	67548.4	.02365	20.1484	.00033	1571.05	428.25	.15972	1.00478	.6088

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

22.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 19.835	.01160	2.3243	1.107	-288.5	-33.2	5.401	5.43	6.84	1711.
20.	.01161	2.3167	1.107	-287.6	-32.1	5.458	5.45	6.88	1710.
21.	.01168	2.2703	1.107	-282.0	-25.1	5.800	5.59	7.13	1702.
22.	.01175	2.2238	1.105	-276.2	-17.8	6.138	5.71	7.37	1695.
23.	.01182	2.1773	1.102	-270.3	-10.3	6.471	5.82	7.61	1687.
24.	.01189	2.1308	1.098	-264.1	-2.6	6.799	5.92	7.84	1680.
25.	.01196	2.0846	1.093	-257.8	5.4	7.124	6.02	8.07	1672.
26.	.01204	2.0385	1.086	-251.3	13.5	7.445	6.11	8.29	1663.
27.	.01212	1.9928	1.079	-244.6	21.9	7.762	6.19	8.50	1655.
28.	.01220	1.9476	1.070	-237.8	30.5	8.075	6.27	8.72	1646.
29.	.01228	1.9030	1.061	-230.8	39.4	8.384	6.34	8.93	1637.
30.	.01236	1.8591	1.051	-223.6	48.4	8.691	6.41	9.14	1628.
31.	.01245	1.8157	1.043	-216.3	57.7	8.995	6.47	9.35	1620.
32.	.01254	1.7748	1.031	-208.8	67.1	9.295	6.53	9.55	1611.
33.	.01264	1.7338	1.018	-201.2	76.8	9.592	6.58	9.73	1601.
34.	.01273	1.6912	1.004	-193.5	86.6	9.885	6.63	9.92	1590.
36.	.01293	1.6150	.9760	-177.6	106.8	10.462	6.72	10.27	1571.
38.	.01314	1.5350	.9468	-161.3	127.7	11.027	6.80	10.62	1549.
40.	.01335	1.4676	.9167	-144.5	149.2	11.580	6.85	10.93	1531.
42.	.01358	1.4030	.8856	-127.4	171.4	12.120	6.89	11.22	1512.
44.	.01382	1.3406	.8542	-109.9	194.1	12.649	6.93	11.50	1492.
46.	.01407	1.2848	.8227	-92.6	216.9	13.154	7.01	11.80	1471.
48.	.01433	1.2332	.7915	-74.4	240.8	13.663	7.07	12.07	1451.
50.	.01459	1.1839	.7609	-55.9	265.2	14.161	7.12	12.33	1432.
52.	.01487	1.1394	.7309	-37.2	290.1	14.649	7.17	12.56	1413.
56.	.01545	1.0601	.6734	1.3	341.5	15.601	7.26	12.99	1377.
60.	.01609	.9927	.6193	40.2	394.1	16.509	7.34	13.34	1343.
65.	.01692	.9299	.5583	89.5	461.8	17.592	7.48	13.72	1306.
70.	.01780	.8831	.5046	139.5	531.2	18.621	7.67	14.07	1273.
75.	.01873	.8498	.4577	190.3	602.4	19.603	7.92	14.40	1243.
80.	.01969	.8291	.4170	242.0	675.2	20.542	8.21	14.72	1219.
90.	.02168	.8110	.3506	348.4	825.5	22.312	8.93	15.34	1181.
100.	.02374	.8163	.3002	459.6	981.9	23.959	9.72	15.94	1157.
110.	.02582	.8367	.2616	577.7	1145.7	25.520	10.57	16.57	1145.
120.	.02790	.8643	.2314	699.9	1313.7	26.982	11.26	17.05	1144.
130.	.02999	.8960	.2075	826.3	1486.0	28.360	11.80	17.42	1150.
140.	.03207	.9309	.1880	955.9	1661.4	29.660	12.20	17.66	1161.
160.	.03620	1.0099	.1582	1219.7	2016.0	32.028	12.55	17.75	1195.
180.	.04028	1.0936	.1365	1482.4	2368.5	34.104	12.50	17.47	1236.
200.	.04430	1.1784	.1200	1738.8	2713.3	35.920	12.23	17.03	1281.
220.	.04827	1.2638	.1071	1986.9	3048.7	37.519	11.89	16.54	1326.
240.	.05219	1.3483	.0966	2226.5	3374.8	38.938	11.56	16.09	1370.
260.	.05608	1.4326	.0881	2458.8	3692.5	40.209	11.28	15.72	1412.
280.	.05993	1.5155	.0810	2684.9	4003.3	41.362	11.06	15.41	1453.
300.	.06392	1.6065	.0758	2907.5	4313.7	42.423	10.88	15.26	1501.
350.	.07351	1.8164	.0642	3450.1	5067.3	44.746	10.63	14.92	1597.
400.	.08303	2.0248	.0558	3982.0	5808.8	46.728	10.52	14.76	1686.
450.	.09252	2.2323	.0494	4508.8	6544.2	48.461	10.48	14.58	1769.
500.	.10197	2.4392	.0443	5034.1	7277.4	50.005	10.46	14.54	1848.
550.	.11140	2.6457	.0402	5557.9	8008.7	51.399	10.46	14.62	1923.
600.	.12082	2.8520	.0368	6081.9	8740.0	52.670	10.47	14.62	1996.
700.	.13963	3.2641	.0315	7131.3	10203.1	54.927	10.51	14.65	2133.
800.	.15841	3.6759	.0275	8186.9	11672.0	56.887	10.60	14.73	2260.
900.	.17718	4.0876	.0244	9252.4	13150.5	58.627	10.72	14.85	2379.
1000.	.19595	4.4993	.0220	10331.3	14642.1	60.201	10.88	15.00	2491.
1200.	.23346	5.3227	.0183	12543.7	17679.9	62.957	11.26	15.38	2697.
1400.	.27096	6.1463	.0157	14837.7	20798.9	65.365	11.69	15.81	2883.
1600.	.30846	6.9702	.0137	17217.0	24003.1	67.482	12.10	16.22	3057.
1800.	.34596	7.7941	.0122	19681.5	27292.6	69.381	12.49	16.61	3220.
2000.	.38347	8.6182	.0110	22232.9	30669.2	71.226	12.89	17.02	3373.
2200.	.42102	9.4424	.0100	24869.3	34131.7	73.548	13.37	17.51	3517.
2400.	.45868	10.2667	.0092	27615.3	37706.3	76.149	13.98	18.16	3651.
2600.	.49658	11.0910	.0085	30509.4	41434.2	78.944	14.83	19.07	3776.
2800.	.53492	11.9154	.0079	33610.7	45378.9	81.802	16.01	20.36	3893.
3000.	.57401	12.7398	.0073	36999.6	49627.8	84.567	17.60	22.15	4003.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

22.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 19.835	86.1915	1237.7	.23646	200.3367	.00553	135.33	389.82	.00083	1.28412	1.9701
20.	86.1126	1240.0	.23571	199.4935	.00555	136.34	383.11	.00083	1.28384	1.9336
21.	85.6298	1252.5	.23141	194.4029	.00569	141.86	346.91	.00084	1.29211	1.7439
22.	85.1375	1263.3	.22745	189.3277	.00584	146.47	316.97	.00084	1.28036	1.5959
23.	84.6359	1272.4	.22380	184.2761	.00598	150.31	291.88	.00084	1.27857	1.4779
24.	84.1251	1280.1	.22039	179.2570	.00613	153.47	270.62	.00084	1.27675	1.3826
25.	83.6054	1286.5	.21719	174.2797	.00627	156.07	252.43	.00083	1.27489	1.3045
26.	83.0769	1291.9	.21414	169.3539	.00641	158.10	236.71	.00083	1.27301	1.2405
27.	82.5398	1296.7	.21115	164.4893	.00656	159.71	223.02	.00082	1.27110	1.1875
28.	81.9943	1300.9	.20822	159.6962	.00670	160.95	211.00	.00081	1.26917	1.1432
29.	81.4407	1304.3	.20543	154.9848	.00685	161.87	200.38	.00080	1.26720	1.1057
30.	80.8791	1306.6	.20282	150.3656	.00699	162.51	190.94	.00079	1.26521	1.0734
31.	80.3017	1307.3	.20073	145.8000	.00716	162.27	182.41	.00078	1.26317	1.0515
32.	79.7230	1310.3	.19798	141.4922	.00729	161.88	174.79	.00077	1.26112	1.0308
33.	79.1392	1312.1	.19534	137.2143	.00742	161.34	167.92	.00075	1.25906	1.0131
34.	78.5491	1312.2	.19275	132.8393	.00756	160.73	161.68	.00074	1.25697	.9981
36.	77.3507	1314.7	.18769	124.9214	.00781	159.20	150.76	.00072	1.25275	.9728
38.	76.1310	1311.4	.18300	116.8606	.00810	157.37	141.53	.00070	1.24846	.9556
40.	74.8894	1310.3	.17882	109.9089	.00834	155.31	133.59	.00068	1.24411	.9400
42.	73.6316	1308.6	.17463	103.3082	.00857	153.08	126.68	.00067	1.23970	.9284
44.	72.3632	1306.5	.17031	97.0078	.00881	150.78	120.62	.00065	1.23528	.9203
46.	71.0858	1310.2	.16518	91.3284	.00901	148.46	115.24	.00064	1.23083	.9162
48.	69.8029	1312.7	.16049	86.0786	.00920	146.15	110.43	.00062	1.22637	.9120
50.	68.5179	1314.3	.15598	81.1197	.00938	143.89	106.10	.00061	1.22191	.9090
52.	67.2339	1316.7	.15163	76.6029	.00954	141.70	102.18	.00060	1.21747	.9060
56.	64.6783	1322.5	.14336	68.5652	.00982	137.58	95.38	.00059	1.20866	.9004
60.	62.1590	1329.5	.13569	61.7071	.01004	134.07	89.70	.00058	1.20002	.8928
65.	59.0971	1350.3	.12630	54.9559	.01016	131.10	83.90	.00058	1.18957	.8779
70.	56.1677	1382.7	.11713	49.6016	.01017	128.72	79.30	.00059	1.17964	.8665
75.	53.3927	1427.6	.10831	45.3741	.01009	126.94	75.67	.00059	1.17027	.8585
80.	50.7897	1486.2	.09996	42.1081	.00990	125.83	72.86	.00061	1.16154	.8522
90.	46.1163	1636.5	.08516	37.3989	.00937	129.07	69.13	.00066	1.14596	.8218
100.	42.1248	1825.7	.07335	34.3878	.00873	133.42	67.23	.00072	1.13277	.8032
110.	38.7330	2053.0	.06387	32.4091	.00807	141.77	67.55	.00080	1.12165	.7894
120.	35.8380	2281.6	.05737	30.9735	.00747	146.29	67.01	.00086	1.11222	.7810
130.	33.3484	2508.6	.05272	29.8813	.00694	151.51	67.11	.00094	1.10415	.7716
140.	31.1839	2727.2	.04943	29.0286	.00648	156.34	67.66	.00102	1.09716	.7644
160.	27.6265	3130.0	.04562	27.8988	.00567	164.13	69.65	.00120	1.08575	.7533
180.	24.8290	3476.2	.04397	27.1517	.00503	170.02	72.39	.00141	1.07684	.7440
200.	22.5752	3775.1	.04345	26.6016	.00451	175.03	75.55	.00164	1.06970	.7350
220.	20.7183	4045.6	.04345	26.1833	.00409	179.86	78.96	.00189	1.06384	.7262
240.	19.1592	4301.9	.04362	25.8330	.00374	184.87	82.50	.00216	1.05894	.7182
260.	17.8323	4556.1	.04379	25.5464	.00345	190.23	86.11	.00244	1.05478	.7114
280.	16.6866	4811.8	.04389	25.2890	.00320	195.97	89.75	.00274	1.05119	.7057
300.	15.6457	5059.5	.04456	25.1355	.00302	202.08	93.40	.00305	1.04795	.7055
350.	13.6037	5740.3	.04444	24.7099	.00260	218.57	102.46	.00388	1.04160	.6995
400.	12.0431	6449.1	.04406	24.3855	.00229	236.12	111.34	.00478	1.03676	.6959
450.	10.8089	7176.2	.04359	24.1293	.00205	254.06	120.01	.00576	1.03295	.6936
500.	9.8070	7906.7	.04319	23.9216	.00185	272.02	128.46	.00682	1.02986	.6914
550.	8.9766	8643.0	.04281	23.7498	.00169	289.81	136.70	.00795	1.02731	.6898
600.	8.2769	9383.8	.04246	23.6056	.00156	307.39	144.74	.00914	1.02516	.6885
700.	7.1619	10885.3	.04180	23.3771	.00135	342.04	160.29	.01173	1.02175	.6867
800.	6.3126	12426.0	.04112	23.2044	.00119	376.41	175.22	.01457	1.01915	.6857
900.	5.6438	14017.4	.04039	23.0696	.00106	410.92	189.63	.01765	1.01711	.6852
1000.	5.1034	15667.3	.03961	22.9615	.00096	445.85	203.58	.02097	1.01546	.6849
1200.	4.2834	19143.4	.03799	22.7992	.00080	511.13	230.36	.02794	1.01297	.6930
1400.	3.6905	22846.9	.03639	22.6834	.00069	583.32	255.89	.03599	1.01116	.6935
1600.	3.2419	26693.0	.03500	22.5966	.00061	655.42	280.38	.04486	1.00980	.6940
1800.	2.8905	30652.5	.03382	22.5290	.00054	727.44	303.95	.05454	1.00874	.6940
2000.	2.6078	34813.3	.03268	22.4743	.00049	802.64	326.67	.06510	1.00788	.6927
2200.	2.3752	39308.2	.03146	22.4273	.00045	886.34	344.89	.07673	1.00717	.6813
2400.	2.1802	44379.3	.03004	22.3829	.00041	987.80	366.23	.08983	1.00658	.6732
2600.	2.0138	50383.3	.02830	22.3348	.00038	1120.48	387.14	.10504	1.00608	.6589
2800.	1.8694	57780.2	.02623	22.2752	.00035	1301.62	407.73	.12309	1.00564	.6379
3000.	1.7421	67097.7	.02389	22.1945	.00033	1551.11	428.20	.14470	1.00526	.6115

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

24.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 20.300	.01152	2.4124	1.120	-285.9	-9.4	5.435	5.48	6.88	1741.
21.	.01156	2.3807	1.120	-282.0	-4.5	5.671	5.57	7.05	1736.
22.	.01163	2.3354	1.119	-276.4	2.6	6.004	5.69	7.29	1729.
23.	.01169	2.2899	1.117	-270.6	10.0	6.333	5.81	7.52	1722.
24.	.01176	2.2445	1.113	-264.6	17.7	6.658	5.91	7.74	1715.
25.	.01183	2.1991	1.109	-258.4	25.5	6.979	6.01	7.96	1707.
26.	.01190	2.1539	1.103	-252.0	33.6	7.295	6.10	8.18	1700.
27.	.01197	2.1089	1.096	-245.5	41.9	7.608	6.18	8.39	1692.
28.	.01205	2.0643	1.089	-238.8	50.4	7.917	6.26	8.60	1683.
29.	.01213	2.0202	1.080	-232.0	59.1	8.222	6.34	8.80	1675.
30.	.01221	1.9767	1.071	-225.0	68.0	8.524	6.41	9.00	1666.
31.	.01229	1.9338	1.061	-217.9	77.1	8.822	6.47	9.20	1658.
32.	.01237	1.8918	1.051	-210.6	86.4	9.117	6.53	9.39	1649.
33.	.01246	1.8526	1.042	-203.1	95.9	9.411	6.59	9.59	1642.
34.	.01255	1.8136	1.029	-195.6	105.6	9.700	6.64	9.76	1633.
36.	.01273	1.7350	1.002	-180.1	125.5	10.268	6.73	10.11	1614.
38.	.01292	1.6620	.9740	-164.2	146.0	10.823	6.81	10.43	1596.
40.	.01312	1.5846	.9451	-147.8	167.2	11.366	6.86	10.74	1575.
42.	.01333	1.5207	.9154	-131.1	188.9	11.897	6.91	11.02	1558.
44.	.01355	1.4602	.8853	-114.0	211.2	12.416	6.95	11.29	1540.
46.	.01378	1.4025	.8548	-97.1	233.6	12.912	7.03	11.58	1520.
48.	.01401	1.3475	.8245	-79.3	257.0	13.411	7.09	11.85	1500.
50.	.01426	1.2986	.7946	-61.2	281.0	13.900	7.15	12.09	1482.
52.	.01451	1.2533	.7653	-42.9	305.4	14.379	7.20	12.32	1464.
56.	.01504	1.1701	.7089	-5.2	355.8	15.312	7.30	12.74	1429.
60.	.01561	1.1015	.6558	32.9	407.5	16.203	7.38	13.09	1398.
65.	.01636	1.0314	.5943	81.3	473.9	17.267	7.52	13.48	1359.
70.	.01715	.9787	.5398	130.6	542.2	18.279	7.71	13.84	1325.
75.	.01798	.9401	.4919	180.8	612.3	19.245	7.96	14.20	1295.
80.	.01884	.9126	.4499	232.1	684.1	20.173	8.26	14.55	1268.
90.	.02063	.8860	.3806	338.0	833.0	21.926	8.97	15.23	1227.
100.	.02248	.8836	.3273	449.1	988.7	23.565	9.76	15.88	1199.
110.	.02437	.8972	.2857	567.4	1152.2	25.123	10.61	16.55	1183.
120.	.02626	.9203	.2531	689.9	1320.1	26.584	11.29	17.05	1179.
130.	.02816	.9492	.2270	816.7	1492.5	27.963	11.83	17.43	1182.
140.	.03005	.9814	.2057	946.7	1667.9	29.263	12.23	17.68	1191.
160.	.03382	1.0549	.1732	1211.4	2023.2	31.635	12.58	17.79	1221.
180.	.03756	1.1359	.1494	1475.0	2376.5	33.716	12.53	17.52	1260.
200.	.04125	1.2194	.1313	1732.4	2722.3	35.538	12.26	17.07	1303.
220.	.04489	1.3032	.1171	1981.3	3058.6	37.141	11.92	16.59	1346.
240.	.04849	1.3873	.1057	2221.8	3385.6	38.564	11.60	16.14	1389.
260.	.05206	1.4706	.0963	2454.9	3704.2	39.839	11.32	15.76	1431.
280.	.05559	1.5537	.0885	2681.8	4015.9	40.994	11.09	15.45	1471.
300.	.05925	1.6440	.0828	2903.8	4325.9	42.054	10.89	15.29	1519.
350.	.06806	1.8531	.0701	3447.3	5080.6	44.380	10.64	14.94	1613.
400.	.07679	2.0610	.0609	3979.9	5822.9	46.364	10.53	14.77	1701.
450.	.08549	2.2681	.0539	4507.2	6558.9	48.099	10.49	14.69	1783.
500.	.09415	2.4746	.0483	5032.9	7292.6	49.644	10.47	14.65	1861.
550.	.10280	2.6808	.0438	5557.0	8024.2	51.039	10.46	14.63	1936.
600.	.11143	2.8867	.0401	6081.3	8755.7	52.310	10.47	14.63	2008.
700.	.12868	3.2983	.0343	7131.1	10219.3	54.567	10.52	14.66	2144.
800.	.14589	3.7096	.0300	8186.9	11688.4	56.528	10.60	14.73	2270.
900.	.16310	4.1209	.0266	9252.6	13167.0	58.268	10.72	14.85	2389.
1000.	.18030	4.5323	.0240	10331.6	14658.8	59.842	10.88	15.00	2500.
1200.	.21468	5.3553	.0200	12544.3	17696.7	62.598	11.26	15.38	2705.
1400.	.24906	6.1785	.0171	14838.4	20815.8	65.006	11.69	15.81	2890.
1600.	.28343	7.0020	.0150	17217.7	24020.0	67.123	12.10	16.22	3063.
1800.	.31780	7.8257	.0133	19682.2	27309.5	69.022	12.49	16.61	3226.
2000.	.35219	8.6496	.0120	22233.2	30685.7	70.866	12.89	17.02	3379.
2200.	.38661	9.4736	.0109	24868.4	34146.9	73.188	13.35	17.50	3522.
2400.	.42112	10.2977	.0100	27611.3	37718.2	75.788	13.96	18.13	3657.
2600.	.45584	11.1219	.0092	30498.4	41438.7	78.580	14.79	19.02	3782.
2800.	.49096	11.9462	.0086	33586.2	45369.1	81.432	15.92	20.27	3899.
3000.	.52673	12.7705	.0080	36951.3	49592.8	84.189	17.46	21.99	4009.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

24.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 20.300	86.8172	1285.9	.23558	209.4394	.00535	140.60	402.08	.00085	1.28636	1.9669
21.	86.4899	1295.6	.23260	205.9105	.00544	144.52	374.57	.00085	1.28519	1.8271
22.	86.0150	1307.8	.22862	200.8776	.00557	149.33	341.16	.00086	1.28349	1.6649
23.	85.5314	1318.2	.22497	195.8609	.00570	153.35	313.28	.00086	1.28176	1.5359
24.	85.0394	1327.3	.22156	190.8687	.00583	156.68	289.73	.00086	1.28001	1.4318
25.	84.5393	1334.9	.21837	185.9097	.00596	159.43	269.64	.00085	1.27822	1.3465
26.	84.0311	1341.6	.21532	180.9929	.00609	161.61	252.34	.00085	1.27641	1.2766
27.	83.5151	1347.6	.21235	176.1274	.00622	163.34	237.31	.00084	1.27457	1.2187
28.	82.9915	1352.9	.20944	171.3226	.00635	164.70	224.16	.00083	1.27271	1.1702
29.	82.4604	1357.4	.20668	166.5879	.00649	165.72	212.57	.00082	1.27082	1.1291
30.	81.9220	1360.7	.20411	161.9329	.00662	166.47	202.29	.00081	1.26891	1.0938
31.	81.3766	1363.9	.20153	157.3672	.00674	166.34	193.11	.00080	1.26698	1.0679
32.	80.8245	1366.7	.19900	152.9007	.00687	166.02	184.88	.00079	1.26502	1.0460
33.	80.2552	1368.7	.19700	148.6825	.00701	165.51	177.35	.00077	1.26300	1.0275
34.	79.6883	1371.6	.19447	144.5215	.00712	164.95	170.61	.00076	1.26100	1.0100
36.	78.5450	1374.6	.18957	136.2770	.00735	163.54	158.91	.00074	1.25696	.9824
38.	77.3810	1377.2	.18490	128.6050	.00757	161.81	149.05	.00072	1.25286	.9608
40.	76.2003	1372.7	.18078	120.7474	.00783	159.85	140.62	.00070	1.24871	.9452
42.	75.0009	1373.2	.17671	114.0513	.00803	157.69	133.31	.00069	1.24450	.9318
44.	73.7929	1374.3	.17251	107.7547	.00822	155.45	126.92	.00067	1.24027	.9218
46.	72.5767	1379.2	.16747	101.7880	.00840	153.18	121.26	.00066	1.23602	.9169
48.	71.3536	1382.0	.16287	96.1475	.00858	150.92	116.22	.00064	1.23176	.9127
50.	70.1302	1386.1	.15845	91.0690	.00873	148.69	111.70	.00063	1.22750	.9085
52.	68.9070	1390.3	.15420	86.3606	.00886	146.53	107.61	.00062	1.22326	.9049
56.	66.4728	1398.0	.14612	77.7819	.00911	142.44	100.52	.00061	1.21484	.8992
60.	64.0694	1408.5	.13866	70.5749	.00929	138.93	94.60	.00060	1.20657	.8912
65.	61.1381	1429.8	.12926	63.0573	.00943	135.96	88.52	.00059	1.19653	.8774
70.	58.3171	1463.3	.12004	57.0761	.00946	133.52	83.62	.00060	1.18692	.8667
75.	55.6308	1509.2	.11113	52.3013	.00941	131.66	79.71	.00060	1.17782	.8594
80.	53.0883	1566.9	.10266	48.4474	.00929	130.42	76.60	.00061	1.16925	.8547
90.	48.4772	1718.6	.08756	42.9526	.00886	133.51	72.33	.00065	1.15381	.8252
100.	44.4809	1907.3	.07541	39.3019	.00833	137.63	69.96	.00070	1.14055	.8073
110.	41.0414	2133.1	.06562	36.8214	.00776	146.00	69.75	.00077	1.12921	.7908
120.	38.0809	2361.2	.05885	35.0463	.00722	150.18	69.04	.00083	1.11952	.7838
130.	35.5171	2588.5	.05400	33.7135	.00673	155.20	68.97	.00090	1.11117	.7745
140.	33.2795	2806.4	.05056	32.6598	.00630	159.88	69.37	.00098	1.10392	.7670
160.	29.5650	3203.1	.04656	31.1885	.00555	167.29	71.08	.00115	1.09196	.7558
180.	26.6240	3546.3	.04479	30.2420	.00494	172.76	73.60	.00133	1.08255	.7463
200.	24.2438	3844.2	.04416	29.5624	.00444	177.37	76.58	.00154	1.07498	.7371
220.	22.2769	4112.8	.04408	29.0318	.00403	181.85	79.85	.00177	1.06876	.7283
240.	20.6220	4369.3	.04419	28.6092	.00369	186.56	83.27	.00202	1.06353	.7204
260.	19.2104	4623.5	.04429	28.2515	.00341	191.67	86.79	.00228	1.05910	.7135
280.	17.9895	4881.2	.04433	27.9499	.00316	197.21	90.36	.00255	1.05527	.7078
300.	16.8763	5120.8	.04506	27.7448	.00299	203.15	93.94	.00283	1.05179	.7070
350.	14.6938	5800.9	.04487	27.2296	.00258	219.34	102.88	.00360	1.04498	.7008
400.	13.0222	6509.5	.04443	26.8391	.00227	236.70	111.69	.00443	1.03979	.6969
450.	11.6977	7236.7	.04392	26.5315	.00203	254.52	120.30	.00533	1.03569	.6945
500.	10.6210	7967.2	.04347	26.2827	.00184	272.39	128.70	.00630	1.03237	.6922
550.	9.7276	8703.5	.04306	26.0774	.00168	290.12	136.91	.00734	1.02962	.6904
600.	8.9739	9444.3	.04269	25.9051	.00155	307.65	144.92	.00844	1.02730	.6890
700.	7.7715	10945.9	.04199	25.6324	.00134	342.24	160.44	.01082	1.02361	.6870
800.	6.8542	12486.7	.04128	25.4266	.00118	376.57	175.34	.01343	1.02081	.6859
900.	6.1311	14078.5	.04053	25.2661	.00105	411.05	189.73	.01625	1.01860	.6854
1000.	5.5463	15728.8	.03974	25.1375	.00095	445.96	203.67	.01930	1.01681	.6851
1200.	4.6580	19206.1	.03809	24.9947	.00080	511.13	230.43	.02569	1.01411	.6933
1400.	4.0151	22910.9	.03647	24.8072	.00069	583.32	255.94	.03308	1.01215	.6937
1600.	3.5282	26758.1	.03507	24.7043	.00061	655.41	280.42	.04122	1.01067	.6941
1800.	3.1466	30717.4	.03388	24.6243	.00054	727.37	303.98	.05010	1.00951	.6942
2000.	2.8394	34874.1	.03274	24.5597	.00049	802.36	326.70	.05978	1.00858	.6929
2200.	2.5866	39354.9	.03153	24.5045	.00044	885.48	344.89	.07043	1.00782	.6815
2400.	2.3746	44391.7	.03012	24.4530	.00041	985.58	366.23	.08240	1.00717	.6738
2600.	2.1937	50325.7	.02842	24.3985	.00038	1115.54	387.13	.09626	1.00663	.6600
2800.	2.0368	57597.7	.02640	24.3325	.00035	1291.90	407.71	.11266	1.00615	.6396
3000.	1.8985	66713.6	.02411	24.2450	.00033	1533.71	428.16	.13225	1.00573	.6139

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

26.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 20.756	.01144	2.4989	1.133	-283.2	14.2	5.467	5.52	6.92	1769.
21.	.01145	2.4882	1.133	-281.9	15.9	5.548	5.55	6.97	1768.
22.	.01151	2.4439	1.133	-276.4	23.0	5.878	5.68	7.21	1762.
23.	.01158	2.3994	1.131	-270.7	30.3	6.204	5.79	7.43	1755.
24.	.01164	2.3543	1.128	-264.8	37.9	6.525	5.90	7.65	1748.
25.	.01171	2.3104	1.124	-258.7	45.6	6.841	5.99	7.87	1741.
26.	.01177	2.2660	1.119	-252.5	53.6	7.154	6.09	8.08	1734.
27.	.01184	2.2218	1.113	-246.1	61.8	7.463	6.17	8.28	1727.
28.	.01191	2.1778	1.106	-239.6	70.2	7.768	6.26	8.49	1719.
29.	.01199	2.1342	1.098	-232.9	78.7	8.069	6.33	8.69	1711.
30.	.01206	2.0911	1.090	-226.1	87.5	8.367	6.40	8.88	1703.
31.	.01214	2.0485	1.080	-219.1	96.5	8.662	6.47	9.07	1695.
32.	.01222	2.0066	1.071	-212.0	105.7	8.953	6.53	9.26	1687.
33.	.01230	1.9655	1.060	-204.7	115.0	9.240	6.59	9.44	1678.
34.	.01238	1.9252	1.049	-197.3	124.6	9.525	6.64	9.62	1670.
35.	.01247	1.8904	1.039	-189.8	134.4	9.809	6.69	9.80	1664.
36.	.01255	1.8533	1.026	-182.2	144.2	10.087	6.74	9.96	1655.
37.	.01264	1.8160	1.013	-174.4	154.3	10.363	6.78	10.12	1647.
38.	.01273	1.7794	.9998	-166.5	164.5	10.634	6.82	10.28	1638.
39.	.01282	1.7444	.9858	-158.6	174.8	10.904	6.85	10.42	1629.
40.	.01292	1.7093	.9718	-150.5	185.3	11.169	6.87	10.56	1621.
42.	.01311	1.6348	.9433	-134.2	206.7	11.691	6.92	10.85	1601.
44.	.01331	1.5740	.9141	-117.5	228.7	12.202	6.97	11.11	1584.
46.	.01352	1.5171	.8848	-100.9	250.7	12.690	7.06	11.40	1565.
48.	.01374	1.4625	.8553	-83.5	273.7	13.180	7.12	11.65	1547.
50.	.01396	1.4113	.8261	-65.8	297.3	13.661	7.18	11.89	1529.
52.	.01420	1.3625	.7972	-47.8	321.3	14.132	7.23	12.12	1511.
54.	.01444	1.3197	.7692	-29.6	345.8	14.594	7.28	12.33	1495.
56.	.01468	1.2797	.7419	-10.9	370.9	15.051	7.33	12.52	1478.
58.	.01494	1.2422	.7153	7.8	396.1	15.493	7.37	12.70	1463.
60.	.01520	1.2077	.6895	26.6	421.7	15.927	7.42	12.87	1448.
65.	.01588	1.1337	.6285	74.3	487.0	16.973	7.56	13.27	1411.
70.	.01659	1.0741	.5733	122.9	554.3	17.970	7.75	13.65	1375.
75.	.01734	1.0313	.5243	172.5	623.4	18.924	8.00	14.01	1344.
80.	.01812	.9976	.4812	223.3	694.5	19.840	8.29	14.39	1316.
85.	.01892	.9759	.4432	275.3	767.3	20.724	8.63	14.76	1292.
90.	.01975	.9621	.4096	328.6	842.0	21.578	9.01	15.12	1271.
95.	.02058	.9548	.3798	383.4	918.5	22.405	9.40	15.48	1254.
100.	.02143	.9522	.3535	439.6	996.8	23.208	9.79	15.82	1240.
110.	.02315	.9594	.3094	558.0	1159.9	24.761	10.54	16.53	1220.
120.	.02488	.9781	.2744	680.8	1327.7	26.221	11.32	17.04	1213.
130.	.02662	1.0042	.2463	807.9	1500.0	27.600	11.86	17.43	1215.
140.	.02836	1.0328	.2233	938.3	1675.6	28.901	12.26	17.69	1221.
160.	.03183	1.1016	.1881	1203.6	2031.1	31.274	12.61	17.81	1247.
180.	.03527	1.1794	.1623	1468.1	2385.0	33.360	12.56	17.56	1284.
200.	.03867	1.2608	.1426	1726.2	2731.8	35.186	12.29	17.12	1325.
220.	.04204	1.3439	.1271	1976.0	3069.0	36.793	11.95	16.63	1367.
240.	.04536	1.4264	.1147	2217.3	3396.7	38.219	11.63	16.18	1409.
260.	.04866	1.5096	.1045	2451.1	3716.2	39.498	11.35	15.80	1450.
280.	.05191	1.5918	.0959	2678.8	4028.6	40.656	11.12	15.49	1489.
300.	.05531	1.6819	.0898	2900.3	4338.4	41.714	10.91	15.31	1537.
350.	.06344	1.8902	.0760	3444.6	5094.1	44.043	10.65	14.96	1629.
400.	.07151	2.0975	.0660	3977.9	5837.1	46.029	10.54	14.78	1716.
450.	.07954	2.3040	.0584	4505.7	6573.7	47.765	10.49	14.70	1797.
500.	.08754	2.5101	.0523	5031.8	7307.8	49.311	10.47	14.66	1874.
550.	.09552	2.7159	.0475	5556.2	8039.8	50.707	10.47	14.64	1948.
600.	.10349	2.9215	.0435	6080.7	8771.5	51.979	10.48	14.63	2020.
700.	.11941	3.3324	.0372	7130.9	10235.4	54.236	10.52	14.66	2155.
800.	.13530	3.7433	.0325	8187.0	11704.8	56.197	10.60	14.73	2280.
900.	.15118	4.1542	.0289	9252.9	13183.6	57.937	10.73	14.85	2398.
1000.	.16706	4.5652	.0260	10332.0	14675.5	59.512	10.88	15.00	2509.
1200.	.19879	5.3876	.0216	12544.9	17713.5	62.268	11.26	15.38	2713.
1400.	.23052	6.2104	.0185	14839.1	20832.7	64.676	11.69	15.81	2898.
1600.	.26225	7.0335	.0162	17218.5	24037.0	66.792	12.11	16.22	3070.
1800.	.29397	7.8569	.0144	19683.0	27326.3	68.692	12.49	16.61	3232.
2000.	.32571	8.6806	.0130	22233.7	30702.2	70.536	12.89	17.01	3385.
2200.	.35748	9.5044	.0118	24867.8	34162.3	72.857	13.35	17.49	3528.
2400.	.38933	10.3283	.0108	27607.9	37730.6	75.455	13.94	18.11	3663.
2600.	.42137	11.1524	.0100	30488.9	41444.5	78.245	14.75	18.97	3788.
2800.	.45376	11.9766	.0093	33564.7	45362.4	81.093	15.85	20.18	3905.
3000.	.48673	12.8008	.0087	36909.0	49563.9	83.842	17.34	21.85	4015.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

26.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 20.756	87.4223	1333.3	.23481	218.4609	.00519	145.73	414.39	.00087	1.28853	1.9666
21.	87.3115	1336.9	.23377	217.2446	.00522	147.09	404.17	.00087	1.28813	1.9164
22.	86.8520	1350.5	.22978	212.2542	.00534	152.10	366.94	.00087	1.28649	1.7390
23.	86.3845	1362.3	.22612	207.2732	.00546	156.30	335.97	.00088	1.28481	1.5982
24.	85.9092	1372.7	.22269	202.3095	.00558	159.79	309.91	.00087	1.28311	1.4846
25.	85.4264	1381.6	.21949	197.3713	.00570	162.69	287.75	.00087	1.28139	1.3917
26.	84.9362	1389.5	.21644	192.4670	.00581	164.99	268.72	.00087	1.27964	1.3156
27.	84.4389	1396.6	.21347	187.6052	.00593	166.85	252.24	.00086	1.27786	1.2524
28.	83.9345	1403.1	.21057	182.7946	.00605	168.31	237.85	.00085	1.27607	1.1996
29.	83.4234	1408.7	.20782	178.0440	.00617	169.44	225.21	.00084	1.27425	1.1548
30.	82.9055	1413.0	.20527	173.3623	.00629	170.28	214.02	.00083	1.27240	1.1162
31.	82.3812	1417.1	.20272	168.7583	.00640	170.22	204.06	.00082	1.27054	1.0876
32.	81.8507	1420.7	.20023	164.2410	.00652	169.97	195.14	.00081	1.26866	1.0633
33.	81.3142	1423.7	.19786	159.8192	.00663	169.56	187.11	.00079	1.26675	1.0422
34.	80.7719	1426.2	.19555	155.5019	.00675	169.07	179.85	.00078	1.26483	1.0238
35.	80.2107	1430.0	.19358	151.6293	.00685	168.41	173.15	.00077	1.26285	1.0077
36.	79.6580	1433.1	.19121	147.6268	.00695	167.70	167.14	.00076	1.26089	.9930
37.	79.1022	1435.3	.18889	143.6535	.00705	166.91	161.65	.00075	1.25893	.9804
38.	78.5436	1436.8	.18670	139.7629	.00715	166.06	156.61	.00074	1.25696	.9693
39.	77.9779	1437.9	.18462	136.0262	.00725	165.13	151.94	.00073	1.25496	.9588
40.	77.4132	1438.1	.18262	132.3252	.00734	164.18	147.64	.00072	1.25297	.9498
42.	76.2690	1434.7	.17862	124.6851	.00757	162.09	139.91	.00070	1.24895	.9369
44.	75.1118	1437.4	.17451	118.2239	.00773	159.90	133.16	.00069	1.24489	.9256
46.	73.9473	1445.0	.16957	112.1823	.00789	157.67	127.21	.00067	1.24081	.9195
48.	72.7792	1450.3	.16503	106.4422	.00804	155.44	121.92	.00066	1.23673	.9140
50.	71.6093	1455.1	.16068	101.0649	.00817	153.25	117.19	.00065	1.23265	.9096
52.	70.4365	1459.3	.15648	95.9713	.00831	151.09	112.92	.00064	1.22857	.9060
54.	69.2688	1465.4	.15244	91.4121	.00841	149.02	109.05	.00063	1.22451	.9024
56.	68.1060	1471.4	.14857	87.1538	.00851	147.02	105.53	.00062	1.22049	.8990
58.	66.9501	1476.9	.14492	83.1667	.00860	145.12	102.32	.00061	1.21649	.8955
60.	65.8029	1483.6	.14126	79.4700	.00868	143.51	99.37	.00061	1.21253	.8912
65.	62.9868	1507.4	.13200	71.4067	.00880	140.54	93.00	.00061	1.20286	.8780
70.	60.2661	1541.0	.12273	64.7324	.00886	138.06	87.84	.00060	1.19355	.8684
75.	57.6618	1589.0	.11371	59.4679	.00882	136.11	83.67	.00061	1.18470	.8612
80.	55.1834	1646.5	.10514	55.0509	.00874	134.78	80.31	.00061	1.17631	.8576
85.	52.8431	1717.6	.09713	51.5670	.00859	136.15	77.63	.00063	1.16842	.8417
90.	50.6437	1799.2	.08980	48.7231	.00841	137.74	75.53	.00065	1.16105	.8294
95.	48.5853	1890.2	.08320	46.3870	.00819	139.57	73.92	.00067	1.15417	.8197
100.	46.6621	1988.3	.07737	44.4301	.00796	141.67	72.71	.00069	1.14777	.8120
110.	43.1971	2213.6	.06729	41.4432	.00747	150.04	71.85	.00076	1.13631	.7915
120.	40.1885	2441.5	.06030	39.3070	.00698	153.91	71.01	.00081	1.12641	.7864
130.	37.5660	2669.6	.05526	37.7224	.00653	158.79	70.80	.00087	1.11784	.7771
140.	35.2629	2885.5	.05166	36.4196	.00613	163.34	71.05	.00094	1.11035	.7695
160.	31.4218	3278.5	.04747	34.6155	.00543	170.47	72.52	.00110	1.09793	.7579
180.	28.3535	3617.8	.04558	33.4409	.00485	175.57	74.82	.00127	1.08808	.7482
200.	25.8571	3913.0	.04487	32.6018	.00437	179.80	77.63	.00146	1.08011	.7390
220.	23.7883	4181.4	.04471	31.9687	.00398	183.93	80.76	.00167	1.07354	.7302
240.	22.0442	4436.4	.04475	31.4449	.00365	188.34	84.07	.00190	1.06802	.7223
260.	20.5527	4691.8	.04479	31.0273	.00337	193.19	87.49	.00214	1.06332	.7155
280.	19.2624	4949.6	.04477	30.6617	.00313	198.52	90.98	.00240	1.05926	.7097
300.	18.0791	5182.7	.04556	30.4077	.00295	204.28	94.50	.00266	1.05555	.7084
350.	15.7624	5862.0	.04529	29.7942	.00255	220.16	103.32	.00336	1.04831	.7020
400.	13.9841	6570.2	.04479	29.3312	.00225	237.32	112.04	.00413	1.04278	.6980
450.	12.5726	7297.3	.04424	28.9676	.00201	255.00	120.59	.00497	1.03840	.6953
500.	11.4235	8027.8	.04376	28.6740	.00183	272.78	128.95	.00587	1.03485	.6929
550.	10.4688	8764.1	.04332	28.4319	.00167	290.44	137.13	.00682	1.03190	.6910
600.	9.6626	9504.9	.04292	28.2290	.00154	307.93	145.11	.00784	1.02942	.6895
700.	8.3747	11006.5	.04218	27.9082	.00133	342.45	160.59	.01004	1.02546	.6874
800.	7.3910	12547.5	.04145	27.6665	.00117	376.73	175.45	.01245	1.02245	.6862
900.	6.6145	14139.5	.04068	27.4781	.00105	411.19	189.83	.01507	1.02007	.6856
1000.	5.9860	15790.2	.03986	27.3273	.00095	446.07	203.76	.01788	1.01815	.6853
1200.	5.0303	19268.5	.03819	27.1013	.00080	511.13	230.49	.02379	1.01524	.6935
1400.	4.3380	22974.7	.03655	26.9404	.00069	583.32	256.00	.03062	1.01313	.6938
1600.	3.8132	26823.0	.03514	26.8201	.00060	655.40	280.47	.03814	1.01154	.6943
1800.	3.4017	30782.2	.03394	26.7266	.00054	727.31	304.02	.04634	1.01029	.6943
2000.	3.0702	34935.3	.03280	26.6512	.00049	802.12	326.73	.05528	1.00928	.6930
2200.	2.7974	39403.8	.03159	26.5872	.00044	884.72	344.89	.06510	1.00845	.6818
2400.	2.5685	44410.4	.03020	26.5282	.00041	983.61	366.22	.07612	1.00776	.6743
2600.	2.3732	50282.9	.02854	26.4668	.00038	1111.18	387.12	.08884	1.00717	.6610
2800.	2.2038	57444.8	.02655	26.3942	.00035	1283.32	407.69	.10386	1.00666	.6412
3000.	2.0545	66383.1	.02430	26.2996	.00033	1518.35	428.12	.12176	1.00620	.6161

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

28.00 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	21.205	.01136	2.5840	1.146	-280.5	37.7	5.499	5.56	6.95	1797.
	22.	.01141	2.5495	1.146	-276.2	43.3	5.758	5.66	7.14	1793.
	23.	.01147	2.5061	1.145	-270.6	50.5	6.080	5.78	7.36	1787.
	24.	.01153	2.4625	1.142	-264.8	58.0	6.398	5.88	7.57	1780.
	25.	.01159	2.4189	1.139	-258.9	65.7	6.712	5.98	7.78	1774.
	26.	.01166	2.3753	1.134	-252.8	73.6	7.021	6.08	7.99	1767.
	27.	.01172	2.3318	1.129	-246.5	81.6	7.326	6.17	8.19	1760.
	28.	.01179	2.2884	1.122	-240.1	89.9	7.628	6.25	8.39	1753.
	29.	.01186	2.2454	1.115	-233.6	98.4	7.926	6.33	8.59	1745.
	30.	.01193	2.2027	1.107	-226.9	107.1	8.220	6.40	8.77	1738.
	31.	.01200	2.1604	1.098	-220.0	116.0	8.511	6.47	8.96	1730.
	32.	.01207	2.1188	1.089	-213.1	125.0	8.798	6.53	9.14	1722.
	33.	.01215	2.0777	1.079	-205.9	134.3	9.082	6.59	9.32	1714.
	34.	.01223	2.0374	1.069	-198.7	143.7	9.363	6.65	9.50	1706.
	35.	.01231	1.9979	1.058	-191.3	153.3	9.641	6.70	9.67	1698.
	36.	.01239	1.9594	1.047	-183.9	163.0	9.916	6.74	9.84	1690.
	37	.01247	1.9290	1.036	-176.2	173.0	10.190	6.79	9.99	1685.
	38.	.01256	1.8935	1.023	-168.5	183.1	10.459	6.83	10.14	1677.
	39.	.01264	1.8580	1.010	-160.7	193.3	10.724	6.86	10.28	1669.
	40.	.01273	1.8243	.9969	-152.8	203.6	10.986	6.89	10.42	1661.
	42.	.01291	1.7570	.9693	-136.8	224.7	11.500	6.94	10.68	1645.
	44.	.01310	1.6857	.9413	-120.4	246.4	12.003	6.99	10.96	1626.
	46.	.01329	1.6273	.9127	-104.2	268.0	12.484	7.08	11.24	1608.
	48.	.01350	1.5737	.8841	-87.1	290.8	12.968	7.14	11.49	1591.
	50.	.01370	1.5221	.8556	-69.7	314.0	13.442	7.20	11.72	1574.
	52.	.01392	1.4731	.8273	-52.1	337.6	13.906	7.26	11.94	1556.
	54.	.01414	1.4282	.7996	-34.2	361.7	14.360	7.31	12.15	1540.
	56.	.01437	1.3862	.7726	-15.8	386.5	14.811	7.36	12.34	1524.
	58.	.01460	1.3465	.7463	2.6	411.4	15.247	7.40	12.52	1509.
	60.	.01484	1.3108	.7209	21.1	436.6	15.674	7.45	12.69	1494.
	65.	.01546	1.2344	.6606	68.1	501.0	16.706	7.59	13.09	1458.
	70.	.01612	1.1720	.6050	116.1	567.4	17.690	7.79	13.47	1424.
	75.	.01680	1.1230	.5553	165.2	635.7	18.632	8.03	13.35	1391.
	80.	.01751	1.0848	.5112	215.6	705.9	19.538	8.33	14.24	1362.
	85.	.01824	1.0576	.4721	267.2	778.0	20.413	8.67	14.53	1336.
	90.	.01900	1.0395	.4374	320.3	852.2	21.260	9.04	15.02	1314.
	95.	.01976	1.0284	.4065	374.9	928.2	22.082	9.43	15.39	1295.
	100.	.02054	1.0229	.3790	431.0	1006.1	22.881	9.83	15.75	1280.
	110.	.02212	1.0237	.3326	549.5	1168.7	24.430	10.68	16.49	1257.
	120.	.02371	1.0378	.2955	672.3	1336.3	25.888	11.36	17.03	1248.
	130.	.02531	1.0606	.2654	799.7	1508.5	27.266	11.90	17.43	1247.
	140.	.02692	1.0866	.2407	930.4	1684.1	28.567	12.28	17.69	1251.
	160.	.03012	1.1497	.2029	1196.3	2039.8	30.942	12.64	17.83	1274.
	180.	.03331	1.2234	.1751	1461.5	2394.3	33.030	12.58	17.59	1308.
	200.	.03647	1.3033	.1539	1720.4	2741.6	34.859	12.32	17.15	1347.
	220.	.03960	1.3851	.1372	1970.9	3079.6	36.471	11.98	16.67	1388.
	240.	.04269	1.4673	.1237	2213.0	3408.2	37.901	11.66	16.22	1429.
	260.	.04574	1.5489	.1127	2447.6	3728.4	39.182	11.38	15.84	1468.
	280.	.04877	1.6308	.1034	2676.0	4041.6	40.343	11.15	15.52	1506.
	300.	.05193	1.7203	.0968	2896.9	4351.1	41.399	10.92	15.33	1554.
	350.	.05949	1.9276	.0819	3442.1	5107.7	43.731	10.66	14.97	1645.
	400.	.06698	2.1341	.0711	3976.0	5851.5	45.719	10.55	14.80	1730.
	450.	.07444	2.3401	.0629	4504.3	6588.6	47.457	10.50	14.71	1811.
	500.	.08187	2.5457	.0564	5030.8	7323.1	49.003	10.48	14.66	1887.
	550.	.08928	2.7511	.0511	5555.5	8055.4	50.399	10.48	14.64	1961.
	600.	.09668	2.9563	.0468	6080.3	8787.4	51.672	10.48	14.63	2032.
	700.	.11146	3.3666	.0400	7130.8	10251.6	53.930	10.53	14.66	2165.
	800.	.12622	3.7769	.0350	8187.1	11721.2	55.891	10.61	14.73	2290.
	900.	.14096	4.1873	.0311	9253.2	13200.2	57.631	10.73	14.85	2407.
	1000.	.15570	4.5980	.0279	10332.5	14692.2	59.206	10.88	15.00	2518.
	1200.	.18517	5.4197	.0233	12545.6	17730.3	61.962	11.26	15.38	2720.
	1400.	.21463	6.2420	.0200	14839.9	20849.6	64.370	11.69	15.81	2905.
	1600.	.24409	7.0648	.0175	17219.4	24053.9	66.487	12.11	16.22	3077.
	1800.	.27354	7.8879	.0155	19683.9	27343.1	68.386	12.49	16.61	3238.
	2000.	.30301	8.7112	.0140	22234.4	30718.7	70.230	12.89	17.01	3391.
	2200.	.33251	9.5348	.0127	24867.5	34177.8	72.551	13.35	17.48	3534.
	2400.	.36208	10.3586	.0116	27605.1	37743.4	75.148	13.93	18.09	3668.
	2600.	.39182	11.1825	.0108	30480.6	41451.6	77.935	14.71	18.93	3794.
	2800.	.42187	12.0065	.0100	33545.8	45358.2	80.779	15.78	20.11	3911.
	3000.	.45245	12.8306	.0093	36871.4	49540.0	83.522	17.23	21.72	4021.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

28.00 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	21.205	88.0083	1379.8	.23412	227.4110	.00504	150.73	426.76	.00089	1.29063	1.9638
	22.	87.6531	1391.6	.23094	223.4755	.00513	154.79	394.45	.00089	1.28936	1.8186
	23.	87.1999	1404.8	.22725	218.5311	.00524	159.16	360.09	.00089	1.28773	1.6649
	24.	86.7396	1416.4	.22379	213.5974	.00535	162.81	331.27	.00089	1.28608	1.5413
	25.	86.2722	1426.6	.22058	208.6821	.00546	165.85	306.83	.00089	1.28441	1.4402
	26.	85.7981	1435.7	.21752	203.7934	.00556	168.28	285.92	.00088	1.28272	1.3574
	27.	85.3174	1444.0	.21454	198.9393	.00567	170.25	267.85	.00088	1.28100	1.2887
	28.	84.8302	1451.7	.21164	194.1280	.00578	171.82	252.13	.00087	1.27926	1.2313
	29.	84.3368	1458.3	.20889	189.3677	.00589	173.05	238.34	.00086	1.27750	1.1825
	30.	83.8372	1463.6	.20634	184.6668	.00599	173.97	226.17	.00085	1.27572	1.1406
	31.	83.3317	1468.7	.20381	180.0335	.00610	173.98	215.36	.00084	1.27392	1.1091
	32.	82.8205	1473.2	.20134	175.4760	.00621	173.79	205.70	.00083	1.27210	1.0823
	33.	82.3037	1476.9	.19899	171.0027	.00631	173.44	197.03	.00081	1.27027	1.0591
	34.	81.7815	1480.2	.19671	166.6218	.00642	172.99	189.21	.00080	1.26841	1.0388
	35.	81.2543	1483.2	.19449	162.3412	.00652	172.43	182.11	.00079	1.26654	1.0212
	36.	80.7222	1485.8	.19232	158.1692	.00662	171.77	175.65	.00078	1.26466	1.0059
	37.	80.1708	1491.4	.19040	154.6531	.00670	170.95	169.63	.00077	1.26270	.9916
	38.	79.6309	1494.2	.18825	150.7823	.00679	170.13	164.23	.00076	1.26080	.9790
	39.	79.0888	1495.7	.18626	146.9473	.00687	169.24	159.27	.00075	1.25888	.9676
	40.	78.5454	1497.4	.18434	143.2904	.00696	168.32	154.69	.00074	1.25696	.9574
	42.	77.4471	1499.6	.18039	136.0715	.00712	166.28	146.49	.00072	1.25309	.9411
	44.	76.3388	1498.3	.17637	128.6814	.00731	164.15	139.37	.00071	1.24919	.9306
	46.	75.2198	1507.2	.17147	122.4022	.00746	161.95	133.10	.00069	1.24527	.9236
	48.	74.0969	1514.9	.16702	116.6041	.00758	159.75	127.55	.00068	1.24133	.9171
	50.	72.9730	1521.6	.16273	111.0704	.00770	157.57	122.59	.00066	1.23740	.9119
	52.	71.8491	1527.7	.15859	105.8386	.00782	155.44	118.14	.00065	1.23348	.9076
	54.	70.7270	1534.5	.15457	101.0133	.00792	153.37	114.11	.00064	1.22958	.9037
	56.	69.6092	1541.2	.15074	96.4948	.00801	151.38	110.44	.00063	1.22569	.9003
	58.	68.4956	1547.0	.14715	92.2294	.00809	149.47	107.09	.00063	1.22183	.8969
	60.	67.3919	1554.9	.14357	88.3401	.00816	147.86	104.02	.00062	1.21802	.8926
	65.	64.6769	1581.7	.13449	79.8351	.00827	144.87	97.38	.00062	1.20866	.8797
	70.	62.0472	1618.6	.12520	72.7208	.00832	142.35	91.97	.00061	1.19964	.8701
	75.	59.5203	1666.8	.11613	66.8417	.00831	140.34	87.56	.00061	1.19101	.8640
	80.	57.1053	1725.9	.10743	61.9491	.00825	138.92	83.96	.00061	1.18281	.8607
	85.	54.8122	1796.9	.09932	57.9683	.00814	140.26	81.05	.00063	1.17506	.8457
	90.	52.6444	1879.1	.09188	54.7214	.00799	141.79	78.73	.00065	1.16776	.8340
	95.	50.6046	1970.7	.08516	52.0429	.00781	143.55	76.89	.00066	1.16092	.8246
	100.	48.6892	2070.0	.07920	49.8064	.00761	145.56	75.48	.00068	1.15452	.8168
	110.	45.2146	2295.2	.06889	46.2866	.00719	153.88	73.86	.00074	1.14297	.7917
	120.	42.1725	2522.8	.06170	43.7660	.00675	157.48	72.90	.00079	1.13293	.7885
	130.	39.5041	2751.3	.05648	41.9000	.00633	162.26	72.58	.00085	1.12417	.7795
	140.	37.1500	2967.2	.05275	40.3688	.00596	166.74	72.71	.00091	1.11648	.7716
	160.	33.1965	3355.3	.04836	38.1655	.00532	173.66	73.95	.00106	1.10365	.7595
	180.	30.0178	3689.0	.04636	36.7232	.00477	178.44	76.06	.00122	1.09341	.7499
	200.	27.4181	3983.0	.04556	35.7338	.00431	182.32	78.70	.00140	1.08509	.7405
	220.	25.2544	4250.6	.04533	34.9799	.00392	186.09	81.69	.00159	1.07819	.7317
	240.	23.4260	4506.1	.04531	34.3718	.00360	190.20	84.89	.00180	1.07239	.7239
	260.	21.8607	4759.9	.04529	33.8600	.00333	194.79	88.22	.00203	1.06744	.7172
	280.	20.5035	5018.8	.04521	33.4365	.00309	199.90	91.63	.00226	1.06316	.7115
	300.	19.2549	5245.1	.04604	33.1238	.00292	205.48	95.08	.00251	1.05924	.7096
	350.	16.8102	5923.3	.04570	32.4031	.00253	221.02	103.78	.00316	1.05158	.7031
	400.	14.9294	6631.2	.04515	31.8614	.00223	237.97	112.41	.00388	1.04572	.6989
	450.	13.4340	7358.2	.04455	31.4371	.00200	255.51	120.90	.00465	1.04107	.6961
	500.	12.2147	8088.6	.04404	31.0949	.00181	273.19	129.22	.00549	1.03729	.6936
	550.	11.2005	8824.9	.04357	30.8132	.00166	290.78	137.35	.00638	1.03426	.6916
	600.	10.3431	9565.6	.04315	30.5772	.00153	308.21	145.31	.00733	1.03152	.6900
	700.	8.9719	11067.2	.04237	30.2045	.00132	342.66	160.74	.00938	1.02730	.6877
	800.	7.9229	12608.2	.04161	29.9238	.00117	376.90	175.59	.01162	1.02408	.6865
	900.	7.0941	14200.4	.04082	29.7053	.00105	411.33	189.94	.01406	1.02154	.6858
	1000.	6.4225	15851.5	.03998	29.5305	.00095	446.19	203.85	.01667	1.01949	.6854
	1200.	5.4005	19330.9	.03828	29.2688	.00080	511.13	230.56	.02216	1.01637	.6937
	1400.	4.6592	23038.3	.03663	29.0827	.00069	583.32	256.05	.02851	1.01411	.6940
	1600.	4.0969	26887.6	.03521	28.9436	.00060	655.39	280.51	.03550	1.01240	.6944
	1800.	3.6557	30846.8	.03400	28.8357	.00054	727.26	304.06	.04312	1.01106	.6944
	2000.	3.3002	34996.8	.03285	28.7488	.00049	801.90	326.75	.05142	1.00998	.6932
	2200.	3.0074	39454.5	.03165	28.6754	.00044	884.04	344.88	.06054	1.00909	.6820
	2400.	2.7618	44434.3	.03028	28.6083	.00041	981.86	366.22	.07075	1.00835	.6748
	2600.	2.5522	50252.1	.02864	28.5397	.00038	1107.30	387.11	.08250	1.00771	.6619
	2800.	2.3704	57316.1	.02669	28.4601	.00035	1275.67	407.68	.09634	1.00716	.6427
	3000.	2.2102	66096.2	.02448	28.3582	.00033	1504.66	428.08	.11282	1.00668	.6180

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

30.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 21.645	.01129	2.6677	1.159	-277.7	61.0	5.529	5.60	6.99	1824.
22.	.01131	2.6527	1.159	-275.8	63.5	5.644	5.65	7.07	1823.
23.	.01137	2.6102	1.158	-270.3	70.7	5.963	5.76	7.29	1817.
24.	.01142	2.5675	1.156	-264.7	78.0	6.278	5.87	7.50	1811.
25.	.01148	2.5247	1.153	-258.9	85.7	6.588	5.97	7.71	1805.
26.	.01154	2.4819	1.149	-252.9	93.5	6.895	6.07	7.91	1799.
27.	.01161	2.4391	1.144	-246.7	101.5	7.197	6.16	8.11	1792.
28.	.01167	2.3964	1.138	-240.4	109.7	7.495	6.24	8.30	1785.
29.	.01174	2.3539	1.131	-234.0	118.1	7.790	6.32	8.49	1778.
30.	.01180	2.3117	1.123	-227.4	126.7	8.081	6.39	8.68	1771.
31.	.01187	2.2699	1.115	-220.7	135.4	8.368	6.46	8.86	1764.
32.	.01194	2.2285	1.107	-213.9	144.4	8.652	6.53	9.04	1756.
33.	.01201	2.1876	1.097	-206.9	153.5	8.933	6.59	9.21	1749.
34.	.01209	2.1473	1.088	-199.8	162.8	9.211	6.65	9.38	1741.
35.	.01216	2.1078	1.077	-192.6	172.3	9.485	6.70	9.55	1733.
36.	.01224	2.0691	1.067	-185.2	181.9	9.757	6.75	9.71	1726.
37.	.01232	2.0313	1.056	-177.8	191.7	10.025	6.79	9.87	1718.
38.	.01240	1.9944	1.044	-170.2	201.6	10.290	6.83	10.03	1710.
39.	.01248	1.9684	1.033	-162.5	211.8	10.555	6.87	10.16	1706.
40.	.01256	1.9328	1.020	-154.8	222.1	10.814	6.90	10.29	1699.
42.	.01273	1.8695	.9938	-139.0	242.9	11.322	6.95	10.55	1684.
44.	.01291	1.8048	.9667	-122.9	264.2	11.819	7.01	10.80	1668.
46.	.01309	1.7369	.9392	-107.0	285.6	12.293	7.09	11.10	1648.
48.	.01328	1.6806	.9112	-90.2	308.0	12.770	7.16	11.34	1631.
50.	.01347	1.6300	.8834	-73.1	331.0	13.238	7.23	11.57	1615.
52.	.01367	1.5811	.8557	-55.8	354.3	13.696	7.29	11.79	1599.
54.	.01387	1.5340	.8284	-38.1	378.1	14.145	7.34	11.99	1583.
56.	.01408	1.4913	.8017	-20.0	402.5	14.589	7.39	12.18	1567.
58.	.01430	1.4507	.7756	-2.0	427.1	15.020	7.43	12.35	1553.
60.	.01452	1.4139	.7504	16.3	451.9	15.441	7.48	12.52	1538.
65.	.01510	1.3324	.6905	62.7	515.6	16.460	7.63	12.93	1503.
70.	.01570	1.2694	.6352	110.1	581.2	17.433	7.82	13.31	1470.
75.	.01633	1.2140	.5848	158.8	648.7	18.364	8.07	13.71	1436.
80.	.01698	1.1744	.5399	208.7	718.2	19.261	8.37	14.10	1406.
85.	.01766	1.1411	.4998	260.0	789.7	20.128	8.71	14.51	1379.
90.	.01835	1.1182	.4642	312.8	863.3	20.969	9.08	14.92	1355.
95.	.01905	1.1033	.4323	367.2	938.8	21.786	9.47	15.31	1336.
100.	.01977	1.0945	.4038	423.2	1016.4	22.581	9.86	15.68	1319.
110.	.02123	1.0897	.3553	541.6	1178.4	24.124	10.71	16.45	1294.
120.	.02270	1.0997	.3162	664.6	1345.7	25.580	11.39	17.01	1282.
130.	.02419	1.1187	.2843	792.2	1517.9	26.958	11.92	17.42	1278.
140.	.02568	1.1425	.2580	923.0	1693.4	28.258	12.31	17.69	1281.
160.	.02865	1.2008	.2176	1189.5	2049.2	30.633	12.66	17.84	1301.
180.	.03162	1.2699	.1879	1455.3	2403.9	32.723	12.61	17.52	1332.
200.	.03457	1.3471	.1652	1714.9	2752.0	34.556	12.35	17.19	1369.
220.	.03749	1.4270	.1472	1966.1	3090.7	36.171	12.01	16.71	1409.
240.	.04037	1.5078	.1327	2208.9	3420.0	37.604	11.69	16.26	1448.
260.	.04322	1.5886	.1208	2444.2	3740.9	38.888	11.41	15.87	1487.
280.	.04605	1.6701	.1109	2673.3	4054.8	40.052	11.19	15.56	1524.
300.	.04901	1.7590	.1038	2893.7	4363.9	41.106	10.94	15.36	1571.
350.	.05606	1.9653	.0878	3439.7	5121.5	43.441	10.67	14.99	1661.
400.	.06306	2.1710	.0762	3974.2	5865.9	45.430	10.56	14.81	1745.
450.	.07002	2.3764	.0673	4503.0	6603.5	47.169	10.51	14.72	1824.
500.	.07695	2.5814	.0604	5029.8	7338.4	48.716	10.49	14.67	1900.
550.	.08387	2.7863	.0548	5554.9	8071.0	50.113	10.48	14.65	1973.
600.	.09078	2.9911	.0501	6079.9	8803.3	51.386	10.49	14.64	2043.
700.	.10457	3.4007	.0429	7130.7	10267.9	53.645	10.53	14.66	2176.
800.	.11834	3.8104	.0375	8187.3	11737.6	55.606	10.61	14.74	2300.
900.	.13210	4.2204	.0333	9253.6	13216.8	57.347	10.73	14.85	2417.
1000.	.14586	4.6306	.0299	10333.1	14708.8	58.921	10.89	15.00	2526.
1200.	.17336	5.4516	.0249	12546.3	17747.1	61.678	11.26	15.38	2728.
1400.	.20085	6.2734	.0214	14840.8	20866.4	64.086	11.70	15.81	2912.
1600.	.22834	7.0957	.0187	17220.4	24070.7	66.202	12.11	16.22	3083.
1800.	.25583	7.9185	.0166	19684.9	27359.9	68.101	12.49	16.61	3245.
2000.	.28334	8.7415	.0150	22235.1	30735.2	69.946	12.89	17.01	3396.
2200.	.31086	9.5649	.0136	24867.4	34193.3	72.266	13.34	17.47	3539.
2400.	.33846	10.3885	.0125	27602.8	37756.6	74.862	13.91	18.07	3674.
2600.	.36621	11.2122	.0115	30473.3	41459.6	77.647	14.68	18.90	3799.
2800.	.39424	12.0360	.0107	33529.0	45356.1	80.487	15.73	20.04	3916.
3000.	.42274	12.8600	.0100	36837.9	49520.2	83.224	17.13	21.61	4027.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

30.00 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	21.645	88.5767	1425.6	.23351	236.2981	.00490	155.60	439.19	.00090	1.29267	1.9730
	22.	88.4220	1431.2	.23210	234.5564	.00494	157.41	423.85	.00091	1.29212	1.9038
	23.	87.9818	1445.7	.22837	229.6496	.00504	161.95	385.75	.00091	1.29054	1.7363
	24.	87.5348	1458.6	.22489	224.7472	.00514	165.75	353.91	.00091	1.28893	1.6018
	25.	87.0814	1470.0	.22165	219.8570	.00524	168.92	326.99	.00091	1.28731	1.4920
	26.	86.6217	1480.3	.21857	214.9865	.00534	171.48	304.01	.00090	1.28566	1.4022
	27.	86.1559	1489.8	.21557	210.1434	.00544	173.55	284.22	.00089	1.28399	1.3276
	28.	85.6841	1498.6	.21266	205.3357	.00554	175.23	267.04	.00089	1.28231	1.2653
	29.	85.2066	1506.3	.20990	200.5710	.00564	176.54	252.61	.00088	1.28060	1.2123
	30.	84.7234	1512.6	.20736	195.8572	.00574	177.55	238.78	.00087	1.27888	1.1668
	31.	84.2347	1518.7	.20482	191.2021	.00583	177.62	227.05	.00086	1.27714	1.1324
	32.	83.7407	1524.1	.20236	186.6133	.00593	177.49	216.60	.00084	1.27538	1.1030
	33.	83.2416	1528.7	.20003	182.0987	.00603	177.19	207.24	.00083	1.27360	1.0775
	34.	82.7375	1532.8	.19777	177.6659	.00612	176.80	198.81	.00082	1.27181	1.0551
	35.	82.2286	1536.4	.19557	173.3223	.00622	176.28	191.18	.00081	1.27000	1.0358
	36.	81.7153	1539.7	.19342	169.0756	.00631	175.65	184.24	.00080	1.26818	1.0189
	37.	81.1976	1542.6	.19134	164.9329	.00640	174.93	177.92	.00079	1.26634	1.0042
	38.	80.6760	1545.0	.18937	160.9016	.00649	174.13	172.12	.00077	1.26449	.9911
	39.	80.1347	1551.3	.18770	157.7348	.00655	173.21	166.68	.00077	1.26258	.9775
	40.	79.6102	1552.7	.18581	153.8691	.00663	172.31	161.81	.00076	1.26072	.9666
	42.	78.5503	1558.5	.18203	146.8531	.00677	170.32	153.10	.00074	1.25698	.9481
	44.	77.4833	1562.5	.17806	139.8430	.00691	168.22	145.57	.00072	1.25322	.9346
	46.	76.4083	1567.9	.17326	132.7170	.00708	166.06	138.97	.00071	1.24944	.9286
	48.	75.3261	1576.0	.16884	126.5935	.00720	163.88	133.13	.00069	1.24564	.9216
	50.	74.2419	1585.1	.16462	121.0169	.00730	161.71	127.93	.00068	1.24184	.9154
	52.	73.1587	1593.2	.16052	115.6721	.00740	159.59	123.28	.00067	1.23805	.9104
	54.	72.0777	1600.5	.15655	110.5687	.00749	157.52	119.07	.00066	1.23428	.9064
	56.	70.9997	1608.6	.15275	105.8852	.00757	155.53	115.25	.00065	1.23053	.9025
	58.	69.9274	1615.7	.14919	101.4425	.00765	153.62	111.77	.00064	1.22680	.8988
	60.	68.8615	1624.7	.14564	97.3636	.00771	152.00	108.57	.00063	1.22310	.8944
	65.	66.2364	1652.6	.13667	88.2558	.00782	149.00	101.67	.00063	1.21403	.8822
	70.	63.6849	1693.8	.12750	80.8416	.00786	146.43	96.01	.00062	1.20525	.8726
	75.	61.2321	1742.2	.11834	74.3388	.00787	144.37	91.38	.00062	1.19685	.8675
	80.	58.8765	1805.3	.10957	69.1426	.00781	142.87	87.55	.00062	1.18882	.8639
	85.	56.6333	1876.1	.10135	64.6270	.00773	144.19	84.44	.00063	1.18121	.8497
	90.	54.5005	1958.5	.09381	60.9434	.00762	145.67	81.91	.00065	1.17400	.8387
	95.	52.4837	2050.6	.08700	57.9045	.00747	147.37	79.87	.00066	1.16722	.8297
	100.	50.5805	2150.6	.08094	55.3620	.00729	149.31	78.26	.00068	1.16084	.8221
	110.	47.1078	2377.3	.07041	51.3345	.00692	157.54	75.77	.00073	1.14925	.7914
	120.	44.0441	2605.9	.06304	48.4344	.00653	160.90	74.73	.00077	1.13910	.7901
	130.	41.3401	2833.9	.05767	46.2479	.00615	165.61	74.31	.00083	1.13019	.7816
	140.	38.9443	3050.7	.05381	44.4929	.00580	170.07	74.34	.00089	1.12234	.7733
	150.	34.8991	3436.6	.04923	41.9073	.00519	176.85	75.38	.00102	1.10917	.7605
	180.	31.6242	3764.4	.04712	40.1595	.00468	181.37	77.30	.00117	1.09858	.7508
	200.	28.9273	4054.6	.04625	38.9666	.00424	184.91	79.79	.00134	1.08992	.7416
	220.	26.6772	4319.7	.04595	38.0675	.00387	188.35	82.64	.00152	1.08272	.7330
	240.	24.7712	4574.1	.04586	37.3495	.00355	192.15	85.72	.00172	1.07666	.7253
	260.	23.1356	4828.2	.04578	36.7534	.00329	196.48	88.96	.00193	1.07147	.7187
	280.	21.7153	5088.1	.04565	36.2665	.00306	201.36	92.29	.00215	1.06698	.7130
	300.	20.4046	5307.8	.04652	35.8926	.00289	206.75	95.68	.00238	1.06285	.7106
	350.	17.8377	5984.9	.04611	35.0560	.00250	221.94	104.25	.00299	1.05479	.7041
	400.	15.8585	6692.4	.04551	34.4295	.00221	238.65	112.80	.00366	1.04861	.6999
	450.	14.2821	7419.2	.04486	33.9397	.00198	256.04	121.22	.00438	1.04370	.6970
	500.	12.9948	8149.5	.04431	33.5454	.00180	273.61	129.49	.00517	1.03971	.6943
	550.	11.9229	8885.7	.04381	33.2209	.00165	291.13	137.58	.00600	1.03639	.6922
	600.	11.0157	9626.4	.04337	32.9494	.00152	308.51	145.51	.00689	1.03359	.6905
	700.	9.5629	11127.9	.04256	32.5208	.00132	342.88	160.90	.00880	1.02911	.6881
	800.	8.4501	12669.0	.04177	32.1984	.00116	377.07	175.72	.01090	1.02569	.6868
	900.	7.5698	14261.3	.04095	31.9475	.00104	411.47	190.05	.01318	1.02300	.6860
	1000.	6.8559	15912.7	.04010	31.7470	.00094	446.31	203.94	.01562	1.02081	.6856
	1200.	5.7684	19393.0	.03838	31.4470	.00079	511.13	230.63	.02074	1.01749	.6939
	1400.	4.9788	23101.6	.03671	31.2338	.00068	583.31	256.11	.02668	1.01508	.6942
	1600.	4.3794	26952.0	.03527	31.0748	.00060	655.38	280.55	.03321	1.01326	.6945
	1800.	3.9088	30911.2	.03406	30.9514	.00054	727.21	304.10	.04033	1.01183	.6945
	2000.	3.5294	35058.6	.03290	30.8523	.00049	801.71	326.80	.04808	1.01067	.6933
	2200.	3.2168	39506.6	.03171	30.7688	.00044	883.43	344.88	.05658	1.00973	.6822
	2400.	2.9545	44462.4	.03035	30.6932	.00041	980.29	366.22	.06609	1.00893	.6752
	2600.	2.7307	50231.1	.02873	30.6170	.00038	1103.82	387.11	.07701	1.00825	.6627
	2800.	2.5366	57207.3	.02681	30.5300	.00035	1268.80	407.66	.08985	1.00766	.6440
	3000.	2.3655	65845.4	.02464	30.4206	.00033	1492.37	428.05	.10510	1.00715	.6198

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

35.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 22.715	.01112	2.8721	1.190	-270.6	118.6	5.603	5.70	7.08	1889.
23.	.01113	2.8606	1.190	-269.1	120.6	5.691	5.73	7.14	1888.
24.	.01119	2.8201	1.189	-263.6	127.9	6.000	5.84	7.35	1883.
25.	.01124	2.7794	1.186	-258.1	135.3	6.304	5.94	7.54	1878.
26.	.01129	2.7385	1.183	-252.3	143.0	6.603	6.04	7.74	1873.
27.	.01135	2.6975	1.179	-246.5	150.8	6.899	6.14	7.93	1867.
28.	.01141	2.6564	1.174	-240.4	158.8	7.191	6.22	8.11	1861.
29.	.01147	2.6154	1.168	-234.3	167.0	7.478	6.31	8.30	1855.
30.	.01152	2.5745	1.161	-227.9	175.4	7.763	6.38	8.47	1848.
31.	.01159	2.5338	1.154	-221.5	184.0	8.043	6.46	8.64	1842.
32.	.01165	2.4933	1.147	-214.9	192.7	8.320	6.52	8.81	1835.
33.	.01171	2.4531	1.138	-208.2	201.6	8.594	6.59	8.98	1828.
34.	.01177	2.4133	1.130	-201.4	210.7	8.865	6.65	9.14	1822.
35.	.01184	2.3740	1.121	-194.5	219.9	9.132	6.70	9.30	1815.
36.	.01191	2.3352	1.111	-187.5	229.3	9.396	6.76	9.45	1808.
37.	.01197	2.2970	1.101	-180.3	238.8	9.657	6.81	9.61	1801.
38.	.01204	2.2595	1.091	-173.1	248.5	9.915	6.85	9.75	1794.
39.	.01211	2.2228	1.080	-165.7	258.3	10.170	6.88	9.89	1787.
40.	.01219	2.1869	1.069	-158.3	268.2	10.423	6.92	10.02	1780.
42.	.01233	2.1179	1.047	-143.2	288.6	10.918	6.98	10.28	1767.
44.	.01249	2.0695	1.023	-127.7	309.5	11.405	7.04	10.51	1758.
46.	.01265	2.0085	.9981	-112.4	330.2	11.866	7.13	10.78	1742.
48.	.01281	1.9548	.9725	-96.2	352.0	12.330	7.21	11.02	1729.
50.	.01297	1.8968	.9466	-79.7	374.3	12.784	7.28	11.25	1713.
52.	.01314	1.8424	.9204	-63.0	397.0	13.229	7.34	11.47	1697.
54.	.01332	1.7924	.8941	-46.0	420.2	13.666	7.40	11.67	1681.
56.	.01350	1.7490	.8682	-28.4	444.0	14.099	7.46	11.85	1667.
58.	.01368	1.7066	.8428	-11.0	467.8	14.518	7.50	12.02	1654.
60.	.01387	1.6653	.8179	6.7	492.0	14.928	7.55	12.19	1639.
65.	.01435	1.5755	.7585	51.7	554.0	15.919	7.70	12.59	1605.
70.	.01486	1.5009	.7037	98.0	618.0	16.868	7.90	13.00	1571.
75.	.01538	1.4414	.6533	145.5	684.0	17.779	8.15	13.41	1540.
80.	.01593	1.3958	.6068	194.5	752.0	18.657	8.45	13.81	1510.
85.	.01649	1.3528	.5648	245.1	822.1	19.507	8.79	14.24	1480.
90.	.01706	1.3226	.5269	297.2	894.4	20.333	9.16	14.66	1455.
95.	.01765	1.2957	.4930	351.1	968.8	21.137	9.55	15.10	1431.
100.	.01825	1.2775	.4624	406.7	1045.4	21.922	9.94	15.52	1412.
110.	.01947	1.2593	.4096	524.7	1206.1	23.453	10.79	16.34	1381.
120.	.02071	1.2580	.3662	647.7	1372.5	24.901	11.46	16.95	1364.
130.	.02196	1.2677	.3303	775.6	1544.2	26.275	12.00	17.39	1356.
140.	.02322	1.2843	.3004	906.9	1719.5	27.574	12.38	17.58	1354.
160.	.02574	1.3330	.2538	1174.4	2075.3	29.949	12.73	17.85	1367.
180.	.02826	1.3923	.2195	1441.3	2430.4	32.041	12.67	17.65	1392.
200.	.03077	1.4599	.1932	1702.3	2779.4	33.879	12.41	17.25	1425.
220.	.03327	1.5347	.1722	1955.0	3119.5	35.501	12.08	16.78	1460.
240.	.03574	1.6127	.1553	2199.4	3450.4	36.940	11.75	16.34	1497.
260.	.03819	1.6921	.1413	2436.3	3773.0	38.231	11.48	15.95	1533.
280.	.04061	1.7709	.1296	2667.0	4088.5	39.401	11.26	15.64	1568.
300.	.04316	1.8575	.1213	2886.3	4396.8	40.450	10.98	15.40	1614.
350.	.04921	2.0607	.1025	3434.2	5156.5	42.791	10.71	15.03	1701.
400.	.05521	2.2642	.0889	3970.2	5902.5	44.785	10.58	14.83	1782.
450.	.06117	2.4677	.0785	4500.1	6641.2	46.527	10.53	14.74	1858.
500.	.06712	2.6712	.0704	5027.9	7377.1	48.076	10.51	14.69	1932.
550.	.07305	2.8748	.0638	5553.7	8110.4	49.474	10.50	14.66	2003.
600.	.07897	3.0784	.0584	6079.2	8843.1	50.747	10.50	14.65	2072.
700.	.09078	3.4860	.0499	7131.0	10308.5	53.008	10.54	14.67	2202.
800.	.10258	3.8940	.0436	8188.3	11778.7	54.970	10.62	14.74	2325.
900.	.11438	4.3025	.0388	9255.0	13258.2	56.711	10.74	14.85	2439.
1000.	.12616	4.7115	.0349	10334.8	14750.5	58.285	10.90	15.01	2547.
1200.	.14972	5.5305	.0291	12548.6	17789.0	61.042	11.27	15.38	2747.
1400.	.17328	6.3507	.0249	14843.5	20908.4	63.450	11.70	15.81	2929.
1600.	.19684	7.1718	.0218	17223.3	24112.7	65.567	12.11	16.22	3099.
1800.	.22040	7.9936	.0194	19687.8	27401.8	67.466	12.49	16.61	3259.
2000.	.24397	8.8159	.0174	22237.6	30776.4	69.309	12.89	17.00	3410.
2200.	.26756	9.6385	.0159	24868.1	34232.6	71.629	13.33	17.46	3553.
2400.	.29120	10.4615	.0145	27598.7	37790.8	74.223	13.88	18.04	3687.
2600.	.31497	11.2847	.0134	30458.9	41482.7	77.004	14.61	18.92	3812.
2800.	.33896	12.1081	.0125	33494.4	45357.9	79.835	15.60	19.90	3930.
3000.	.36333	12.9317	.0116	36768.0	49484.4	82.559	16.92	21.37	4041.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

35.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 22.715	89.9284	1537.2	.23225	258.2851	.00461	167.31	470.59	.00095	1.23753	1.9915
23.	89.8102	1541.8	.23123	256.9143	.00463	168.63	457.54	.00095	1.23711	1.9371
24.	89.3915	1558.0	.22764	252.0961	.00471	172.79	416.80	.00095	1.29560	1.7717
25.	88.9674	1572.5	.22430	247.2759	.00480	176.29	382.62	.00095	1.29407	1.6373
26.	88.5380	1585.7	.22114	242.4608	.00488	179.13	353.65	.00094	1.29253	1.5275
27.	88.1035	1598.2	.21807	237.6579	.00496	181.46	328.85	.00094	1.23097	1.4366
28.	87.6641	1609.9	.21510	232.8743	.00504	183.37	307.48	.00093	1.28940	1.3606
29.	87.2198	1620.3	.21229	228.1169	.00512	184.90	288.89	.00092	1.28780	1.2962
30.	86.7710	1629.2	.20972	223.3927	.00520	186.10	272.62	.00091	1.28620	1.2408
31.	86.3176	1637.7	.20716	218.7086	.00528	186.31	258.27	.00090	1.28457	1.1982
32.	85.8598	1645.5	.20468	214.0714	.00536	186.31	245.56	.00089	1.28294	1.1617
33.	85.3978	1652.2	.20235	209.4879	.00543	186.12	234.22	.00087	1.28129	1.1300
34.	84.9317	1658.3	.20010	204.9647	.00551	185.84	224.06	.00086	1.27962	1.1021
35.	84.4616	1663.9	.19791	200.5084	.00559	185.41	214.92	.00085	1.27794	1.0779
36.	83.9876	1668.9	.19580	196.1255	.00567	184.88	206.64	.00084	1.27626	1.0568
37.	83.5100	1673.4	.19376	191.8221	.00574	184.23	199.13	.00083	1.27455	1.0383
38.	83.0289	1677.1	.19183	187.6046	.00581	183.51	192.28	.00082	1.27284	1.0218
39.	82.5445	1679.7	.19009	183.4789	.00589	182.71	186.01	.00081	1.27112	1.0068
40.	82.0570	1682.1	.18839	179.4508	.00596	181.84	180.25	.00080	1.26939	.9935
42.	81.0737	1687.1	.18499	171.7099	.00610	179.91	170.04	.00078	1.26590	.9719
44.	80.0660	1702.1	.18157	165.6944	.00618	177.79	161.17	.00076	1.26233	.9529
46.	79.0744	1715.5	.17698	158.8177	.00628	175.68	153.61	.00074	1.25883	.9427
48.	78.0791	1729.1	.17280	152.6322	.00637	173.54	146.99	.00073	1.25532	.9331
50.	77.0835	1738.0	.16875	146.2088	.00647	171.40	141.14	.00071	1.25181	.9265
52.	76.0855	1747.0	.16479	140.1801	.00657	169.29	135.92	.00070	1.24830	.9210
54.	75.0875	1757.0	.16090	134.5895	.00664	167.21	131.23	.00069	1.24480	.9160
56.	74.0914	1768.3	.15718	129.5832	.00670	165.20	126.99	.00068	1.24131	.9110
58.	73.1007	1779.2	.15368	124.7533	.00676	163.26	123.14	.00067	1.23785	.9065
60.	72.1159	1789.5	.15016	120.0965	.00681	161.63	119.63	.00066	1.23441	.9019
65.	69.6848	1822.7	.14128	109.7904	.00691	158.59	112.04	.00065	1.22596	.8897
70.	67.3054	1866.5	.13228	101.0215	.00697	155.92	105.81	.00064	1.21772	.8824
75.	65.0001	1923.2	.12326	93.6896	.00697	153.70	100.64	.00063	1.20977	.8781
80.	62.7793	1993.9	.11435	87.6305	.00692	152.05	96.33	.00063	1.20214	.8748
85.	60.6511	2068.8	.10591	82.0505	.00688	153.33	92.74	.00064	1.19487	.8614
90.	58.6090	2156.9	.09813	77.5149	.00680	154.73	89.75	.00065	1.18791	.8505
95.	56.6637	2248.7	.09111	73.4173	.00672	156.32	87.27	.00066	1.18131	.8430
100.	54.8072	2349.4	.08484	70.0140	.00660	158.13	85.22	.00067	1.17504	.8362
110.	51.3711	2581.5	.07388	64.6923	.00633	165.98	81.16	.00071	1.16348	.7893
120.	48.2939	2811.9	.06614	60.7526	.00603	168.82	78.99	.00074	1.15320	.7931
130.	45.5384	3039.9	.06046	57.7299	.00572	173.51	78.41	.00079	1.14405	.7861
140.	43.0694	3256.5	.05633	55.3153	.00543	178.05	78.27	.00084	1.13589	.7773
160.	38.8496	3642.1	.05133	51.7872	.00490	184.81	78.90	.00096	1.12203	.7620
180.	35.3863	3960.6	.04896	49.2697	.00446	188.89	80.42	.00109	1.11075	.7513
200.	32.4953	4236.2	.04791	47.4392	.00407	191.73	82.54	.00123	1.10139	.7426
220.	30.0560	4494.6	.04746	46.1257	.00373	194.39	85.07	.00139	1.09354	.7345
240.	27.9774	4747.6	.04722	45.1204	.00344	197.43	87.88	.00155	1.08688	.7273
260.	26.1847	5003.3	.04699	44.3060	.00319	201.06	90.89	.00173	1.08115	.7211
280.	24.6224	5262.5	.04674	43.6041	.00297	205.34	94.03	.00192	1.07619	.7160
300.	23.1706	5466.0	.04768	43.0404	.00282	210.22	97.25	.00212	1.07158	.7125
350.	20.3223	6139.9	.04710	41.8772	.00245	224.45	105.49	.00265	1.06259	.7062
400.	18.1136	6846.0	.04636	41.0123	.00217	240.53	113.81	.00322	1.05566	.7019
450.	16.3468	7572.4	.04561	40.3390	.00195	257.50	122.06	.00385	1.05013	.6988
500.	14.8989	8302.3	.04497	39.7984	.00177	274.78	130.20	.00452	1.04562	.6959
550.	13.6895	9038.2	.04441	39.3544	.00162	292.08	138.20	.00524	1.04186	.6936
600.	12.6634	9778.7	.04390	38.9832	.00150	309.30	146.06	.00600	1.03868	.6917
700.	11.0151	11279.8	.04300	38.3982	.00130	343.47	161.33	.00765	1.03359	.6890
800.	9.7480	12820.8	.04215	37.9589	.00115	377.53	176.07	.00946	1.02968	.6875
900.	8.7431	14413.5	.04128	37.6175	.00103	411.84	190.34	.01142	1.02659	.6865
1000.	7.9264	16065.5	.04039	37.3450	.00093	446.62	204.19	.01352	1.02409	.6860
1200.	6.6790	19547.9	.03860	36.9381	.00079	511.13	230.82	.01791	1.02027	.6945
1400.	5.7709	23259.3	.03689	36.6497	.00068	583.31	256.26	.02302	1.01750	.6946
1600.	5.0803	27111.9	.03543	36.4349	.00060	655.37	280.68	.02863	1.01539	.6948
1800.	4.5372	31071.5	.03419	36.2687	.00053	727.11	304.20	.03474	1.01374	.6947
2000.	4.0989	35213.4	.03303	36.1356	.00048	801.30	326.89	.04139	1.01240	.6936
2200.	3.7375	39641.2	.03184	36.0243	.00044	882.14	344.88	.04867	1.01131	.6825
2400.	3.4340	44546.7	.03051	35.9252	.00040	976.97	366.21	.05678	1.01039	.6761
2600.	3.1749	50212.1	.02894	35.8282	.00037	1096.45	387.09	.06606	1.00960	.6644
2800.	2.9502	57003.1	.02709	35.7217	.00035	1254.28	407.63	.07691	1.00892	.6468
3000.	2.7523	65341.6	.02500	35.5924	.00033	1466.36	427.98	.08974	1.00832	.6238

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

40.00 MPA ISOBAR

TEMPERATURE	VOLUME	ISOTHERM DERIVATIVE	ISOCHORE DERIVATIVE	INTERNAL ENERGY	ENTHALPY	ENTROPY	CV	CP	VELOCITY OF SOUND
K	CU M/KG	CU M-MPA/KG	MPA/K	KJ/KG-K	KJ/KG	KJ/KG-K	KJ / KG-K		M/S
* 23.746	.01097	3.0705	1.220	-263.2	175.4	5.672	5.78	7.16	1951.
24.	.01098	3.0607	1.220	-261.9	177.3	5.748	5.81	7.22	1950.
25.	.01103	3.0220	1.218	-256.5	184.6	6.047	5.92	7.41	1945.
26.	.01108	2.9829	1.215	-251.0	192.1	6.341	6.02	7.60	1941.
27.	.01113	2.9437	1.212	-245.3	199.8	6.631	6.11	7.78	1936.
28.	.01118	2.9043	1.208	-239.5	207.6	6.917	6.21	7.96	1930.
29.	.01123	2.8648	1.202	-233.5	215.7	7.200	6.29	8.14	1925.
30.	.01128	2.8253	1.197	-227.4	223.9	7.479	6.37	8.31	1919.
31.	.01134	2.7858	1.190	-221.2	232.3	7.754	6.45	8.47	1913.
32.	.01139	2.7464	1.183	-214.9	240.8	8.025	6.52	8.53	1907.
33.	.01145	2.7071	1.176	-208.4	249.6	8.293	6.58	8.79	1901.
34.	.01151	2.6681	1.168	-201.9	258.4	8.558	6.65	8.95	1895.
35.	.01157	2.6293	1.159	-195.2	267.5	8.820	6.71	9.10	1889.
36.	.01163	2.5909	1.151	-188.4	276.6	9.078	6.76	9.25	1882.
37.	.01169	2.5529	1.142	-181.5	285.9	9.334	6.81	9.39	1876.
38.	.01175	2.5154	1.132	-174.5	295.4	9.586	6.86	9.53	1870.
39.	.01181	2.4784	1.122	-167.4	305.0	9.835	6.90	9.66	1863.
40.	.01187	2.4420	1.112	-160.2	314.7	10.081	6.93	9.79	1857.
42.	.01200	2.3712	1.091	-145.6	334.6	10.565	7.00	10.04	1844.
44.	.01214	2.3036	1.070	-130.7	354.9	11.038	7.07	10.29	1831.
46.	.01228	2.2396	1.047	-115.9	375.2	11.489	7.16	10.56	1817.
48.	.01242	2.2010	1.025	-100.2	396.7	11.947	7.24	10.78	1810.
50.	.01257	2.1414	1.001	-84.3	418.5	12.391	7.32	11.01	1795.
52.	.01272	2.0954	.9765	-68.0	440.7	12.827	7.39	11.21	1784.
54.	.01287	2.0472	.9519	-51.5	463.3	13.254	7.45	11.41	1771.
56.	.01303	1.9978	.9274	-34.5	486.6	13.677	7.51	11.60	1757.
58.	.01319	1.9532	.9026	-17.5	510.0	14.087	7.56	11.77	1744.
60.	.01335	1.9092	.8783	-.3	533.7	14.489	7.61	11.93	1730.
65.	.01377	1.8163	.8195	43.6	594.3	15.460	7.77	12.33	1697.
70.	.01420	1.7308	.7646	88.9	657.0	16.388	7.98	12.75	1663.
75.	.01466	1.6626	.7139	135.5	721.8	17.282	8.23	13.17	1631.
80.	.01513	1.6074	.6672	183.7	788.7	18.146	8.53	13.60	1601.
85.	.01561	1.5682	.6242	233.5	857.8	18.983	8.87	14.01	1574.
90.	.01610	1.5299	.5848	285.1	929.0	19.797	9.24	14.45	1547.
95.	.01660	1.4914	.5491	338.5	1002.4	20.591	9.63	14.92	1520.
100.	.01711	1.4676	.5167	393.7	1078.0	21.366	10.02	15.34	1499.
110.	.01815	1.4337	.4605	511.1	1237.2	22.882	10.87	16.23	1463.
120.	.01922	1.4216	.4137	633.9	1402.7	24.322	11.54	16.87	1442.
130.	.02030	1.4221	.3744	761.8	1573.8	25.691	12.07	17.35	1430.
140.	.02139	1.4312	.3413	893.3	1748.8	26.988	12.45	17.66	1425.
160.	.02357	1.4693	.2892	1161.6	2104.5	29.363	12.79	17.85	1432.
180.	.02576	1.5206	.2505	1429.3	2459.7	31.455	12.73	17.66	1452.
200.	.02794	1.5804	.2207	1691.3	2809.0	33.295	12.47	17.28	1480.
220.	.03012	1.6472	.1971	1945.2	3150.0	34.920	12.13	16.84	1512.
240.	.03228	1.7212	.1778	2190.9	3482.2	36.365	11.82	16.41	1546.
260.	.03442	1.7982	.1617	2429.2	3806.1	37.662	11.54	16.02	1580.
280.	.03654	1.8760	.1482	2661.4	4123.2	38.837	11.33	15.71	1613.
300.	.03877	1.9580	.1386	2879.8	4430.6	39.881	11.02	15.44	1657.
350.	.04407	2.1575	.1171	3429.4	5192.1	42.228	10.74	15.06	1739.
400.	.04932	2.3584	.1015	3966.8	5939.5	44.226	10.61	14.86	1817.
450.	.05454	2.5599	.0897	4497.8	6679.3	45.970	10.56	14.76	1892.
500.	.05974	2.7616	.0804	5026.4	7416.0	47.521	10.53	14.70	1964.
550.	.06492	2.9637	.0729	5552.9	8149.9	48.920	10.52	14.67	2033.
600.	.07010	3.1659	.0667	6079.1	8883.2	50.195	10.52	14.66	2100.
700.	.08044	3.5711	.0570	7131.8	10349.2	52.456	10.56	14.68	2228.
800.	.09076	3.9772	.0498	8189.6	11819.9	54.418	10.63	14.74	2348.
900.	.10107	4.3840	.0442	9256.9	13299.6	56.160	10.75	14.86	2461.
1000.	.11137	4.7915	.0398	10337.1	14792.1	57.735	10.90	15.01	2568.
1200.	.13198	5.6082	.0332	12551.4	17830.7	60.492	11.28	15.38	2765.
1400.	.15259	6.4267	.0284	14846.6	20950.2	62.900	11.71	15.81	2946.
1600.	.17320	7.2463	.0249	17226.7	24154.5	65.016	12.12	16.22	3114.
1800.	.19380	8.0669	.0221	19691.2	27443.4	66.915	12.50	16.60	3274.
2000.	.21442	8.8881	.0199	22240.7	30817.5	68.759	12.89	17.00	3424.
2200.	.23505	9.7100	.0181	24869.9	34272.0	71.077	13.32	17.45	3566.
2400.	.25574	10.5322	.0166	27596.7	37826.2	73.669	13.86	18.01	3699.
2600.	.27652	11.3543	.0153	30448.5	41509.2	76.447	14.56	18.76	3825.
2800.	.29748	12.1777	.0142	33467.7	45367.1	79.272	15.50	19.79	3942.
3000.	.31876	13.0008	.0133	36712.9	49463.4	81.986	16.75	21.18	4053.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

40.00 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	23.746	91.1935	1644.6	.23141	280.0107	.00436	178.41	502.49	.00098	1.30209	2.0180
	24.	91.0924	1649.4	.23046	278.8086	.00437	179.48	490.21	.00098	1.30173	1.9708
	25.	90.6916	1667.0	.22700	274.0675	.00444	183.27	446.98	.00098	1.30028	1.8070
	26.	90.2863	1683.3	.22373	269.3192	.00451	186.38	410.60	.00098	1.29882	1.6736
	27.	89.8767	1698.7	.22056	264.5703	.00458	188.96	379.68	.00097	1.29735	1.5635
	28.	89.4630	1713.2	.21750	259.8275	.00465	191.07	353.17	.00097	1.29586	1.4716
	29.	89.0452	1726.4	.21462	255.0973	.00471	192.80	330.25	.00096	1.29435	1.3939
	30.	88.6236	1737.9	.21198	250.3862	.00478	194.17	310.30	.00095	1.29284	1.3272
	31.	88.1982	1748.9	.20936	245.7003	.00484	194.51	292.80	.00094	1.29131	1.2753
	32.	87.7692	1759.2	.20684	241.0461	.00491	194.62	277.37	.00092	1.28977	1.2306
	33.	87.3366	1768.2	.20447	236.4296	.00497	194.53	263.68	.00091	1.28822	1.1918
	34.	86.9007	1776.5	.20219	231.8569	.00504	194.33	251.47	.00090	1.28666	1.1578
	35.	86.4613	1784.1	.19999	227.3338	.00510	193.99	240.52	.00089	1.28509	1.1281
	36.	86.0188	1791.0	.19787	222.8662	.00516	193.53	230.66	.00088	1.28350	1.1021
	37.	85.5732	1797.3	.19582	218.4597	.00523	192.95	221.75	.00086	1.28191	1.0793
	38.	85.1246	1802.6	.19390	214.1198	.00529	192.28	213.65	.00085	1.28031	1.0590
	39.	84.6731	1806.6	.19217	209.8520	.00535	191.53	206.27	.00084	1.27870	1.0405
	40.	84.2189	1810.2	.19049	205.6614	.00541	190.71	199.52	.00083	1.27708	1.0242
	42.	83.3031	1817.2	.18715	197.5321	.00552	188.85	187.62	.00081	1.27382	.9974
	44.	82.3785	1825.1	.18372	189.7700	.00564	186.84	177.47	.00079	1.27053	.9771
	46.	81.4466	1839.6	.17941	182.4096	.00574	184.72	168.71	.00077	1.26722	.9643
	48.	80.4895	1863.4	.17577	177.1544	.00579	182.48	160.96	.00076	1.26383	.9569
	50.	79.5574	1874.7	.17189	170.3629	.00587	180.33	154.32	.00074	1.26054	.9423
	52.	78.6261	1891.3	.16816	164.7520	.00593	178.21	148.44	.00073	1.25725	.9340
	54.	77.6931	1906.3	.16446	159.0507	.00598	176.11	143.19	.00072	1.25396	.9276
	56.	76.7649	1918.1	.16091	153.3536	.00605	174.08	138.48	.00070	1.25069	.9228
	58.	75.8377	1930.8	.15746	148.1271	.00609	172.10	134.22	.00069	1.24743	.9175
	60.	74.9161	1943.2	.15400	143.0324	.00614	170.44	130.34	.00069	1.24420	.9125
	65.	72.6362	1984.5	.14518	131.9255	.00621	167.34	122.02	.00067	1.23623	.8989
	70.	70.4040	2031.5	.13615	121.8556	.00627	164.59	115.23	.00066	1.22845	.8924
	75.	68.2267	2092.6	.12713	113.4349	.00629	162.24	109.56	.00065	1.22090	.8894
	80.	66.1148	2166.3	.11828	106.2738	.00628	160.42	104.80	.00064	1.21361	.8885
	85.	64.0771	2256.1	.10980	100.4830	.00621	161.66	100.78	.00065	1.20660	.8737
	90.	62.1255	2349.0	.10187	95.0470	.00615	163.02	97.40	.00065	1.19991	.8635
	95.	60.2513	2441.3	.09466	89.8598	.00611	164.54	94.54	.00066	1.19350	.8572
	100.	58.4545	2547.7	.08821	85.7859	.00602	166.27	92.13	.00067	1.18739	.8503
	110.	55.0898	2783.1	.07693	78.9795	.00583	173.54	84.07	.00070	1.17599	.7861
	120.	52.0300	3017.0	.06891	73.9680	.00559	175.95	82.87	.00072	1.16569	.7947
	130.	49.2616	3246.2	.06298	70.0549	.00534	180.76	82.22	.00076	1.15643	.7891
	140.	46.7548	3462.8	.05864	66.9139	.00510	185.58	81.96	.00081	1.14808	.7801
	160.	42.4196	3847.2	.05330	62.3257	.00464	192.70	82.32	.00092	1.13374	.7625
	180.	38.8206	4161.3	.05069	59.0296	.00424	196.67	83.52	.00103	1.12194	.7498
	200.	35.7865	4427.5	.04948	56.5563	.00390	199.01	85.32	.00116	1.11205	.7408
	220.	33.2007	4673.3	.04891	54.6870	.00360	200.98	87.56	.00129	1.10367	.7337
	240.	30.9777	4921.5	.04856	53.3182	.00333	203.28	90.12	.00144	1.09650	.7274
	260.	29.0508	5176.9	.04821	52.2382	.00310	206.20	92.90	.00159	1.09031	.7220
	280.	27.3648	5439.8	.04782	51.3371	.00289	209.84	95.85	.00176	1.08492	.7173
	300.	25.7922	5625.3	.04880	50.5022	.00275	214.16	98.90	.00194	1.07990	.7131
	350.	22.6935	6295.7	.04806	48.9622	.00239	227.31	105.81	.00239	1.07007	.7076
	400.	20.2773	7000.3	.04719	47.8225	.00212	242.67	114.89	.00290	1.06245	.7035
	450.	18.3361	7726.0	.04633	46.9380	.00191	259.15	122.97	.00345	1.05635	.7004
	500.	16.7397	8455.5	.04561	46.2291	.00174	276.08	130.97	.00404	1.05136	.6974
	550.	15.4024	9191.1	.04498	45.6475	.00160	293.15	138.87	.00467	1.04719	.6949
	600.	14.2650	9931.3	.04442	45.1617	.00148	310.19	146.64	.00534	1.04365	.6929
	700.	12.4322	11431.9	.04343	44.3967	.00128	344.11	161.79	.00679	1.03797	.6900
	800.	11.0185	12972.7	.04251	43.8227	.00114	378.03	176.44	.00838	1.03360	.6882
	900.	9.8944	14565.5	.04159	43.3771	.00102	412.24	190.65	.01010	1.03013	.6871
	1000.	8.9787	16218.0	.04066	43.0218	.00093	446.95	204.46	.01194	1.02732	.6865
	1200.	7.5767	19702.1	.03882	42.4922	.00078	511.13	231.03	.01579	1.02302	.6952
	1400.	6.5536	23415.8	.03706	42.1174	.00068	583.31	256.42	.02027	1.01989	.6950
	1600.	5.7738	27270.6	.03557	41.8388	.00059	655.35	280.81	.02519	1.01751	.6952
	1800.	5.1599	31230.6	.03431	41.6238	.00053	727.02	304.31	.03055	1.01563	.6950
	2000.	4.6637	35368.3	.03315	41.4520	.00048	800.96	326.98	.03637	1.01412	.6939
	2200.	4.2543	39780.1	.03196	41.3093	.00044	881.10	344.88	.04274	1.01288	.6828
	2400.	3.9103	44645.3	.03065	41.1838	.00040	974.29	366.21	.04982	1.01183	.6768
	2600.	3.6164	50227.9	.02912	41.0636	.00037	1090.51	387.08	.05787	1.01094	.6658
	2800.	3.3615	56870.1	.02733	40.9356	.00035	1242.58	407.61	.05725	1.01016	.6491
	3000.	3.1371	64967.4	.02530	40.7851	.00033	1445.38	427.93	.07832	1.00948	.6270

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

45.00 MPA ISOBAR

TEMPERATURE	VOLUME	ISOTHERM DERIVATIVE	ISOCHORE DERIVATIVE	INTERNAL ENERGY	ENTHALPY	ENTROPY	CV	CP	VELOCITY OF SOUND
K	CU M/KG	CU M-MPA/KG	MPA/K	KJ/KG-K	KJ/KG	KJ/KG-K	KJ / KG-K		M/S
* 24.742	.01082	3.2640	1.249	-255.6	231.5	5.737	5.86	7.25	2009.
25.	.01084	3.2545	1.249	-254.3	233.3	5.812	5.89	7.30	2008.
26.	.01088	3.2173	1.247	-248.9	240.7	6.102	5.99	7.48	2004.
27.	.01093	3.1798	1.244	-243.4	248.3	6.387	6.09	7.66	2000.
28.	.01097	3.1420	1.240	-237.8	256.1	6.669	6.19	7.84	1995.
29.	.01102	3.1041	1.235	-232.1	264.0	6.947	6.28	8.01	1990.
30.	.01107	3.0660	1.230	-226.2	272.1	7.221	6.36	8.17	1985.
31.	.01112	3.0278	1.224	-220.1	280.3	7.492	6.43	8.33	1980.
32.	.01117	2.9896	1.217	-214.0	288.7	7.759	6.51	8.49	1975.
33.	.01122	2.9514	1.210	-207.7	297.3	8.022	6.58	8.64	1969.
34.	.01127	2.9133	1.203	-201.4	306.0	8.283	6.64	8.79	1963.
35.	.01133	2.8753	1.195	-194.9	314.9	8.540	6.70	8.93	1958.
36.	.01138	2.8375	1.187	-188.3	323.9	8.793	6.76	9.08	1952.
37.	.01144	2.8000	1.178	-181.6	333.0	9.044	6.82	9.22	1946.
38.	.01149	2.7628	1.170	-174.8	342.3	9.291	6.86	9.35	1940.
39.	.01155	2.7260	1.160	-167.9	351.7	9.536	6.91	9.48	1934.
40.	.01161	2.6896	1.151	-161.0	361.2	9.777	6.94	9.60	1928.
42.	.01172	2.6182	1.131	-146.8	380.7	10.251	7.02	9.84	1916.
44.	.01184	2.5492	1.111	-132.3	400.6	10.715	7.09	10.08	1904.
46.	.01197	2.4829	1.090	-118.0	420.5	11.156	7.19	10.34	1890.
48.	.01209	2.4198	1.068	-102.8	441.4	11.602	7.28	10.59	1876.
50.	.01222	2.3601	1.046	-87.3	462.8	12.039	7.35	10.82	1863.
52.	.01236	2.3042	1.023	-71.5	484.7	12.467	7.43	11.03	1850.
54.	.01250	2.2794	1.002	-55.3	507.1	12.890	7.49	11.21	1846.
56.	.01264	2.2290	.9786	-38.7	530.0	13.306	7.55	11.40	1834.
58.	.01278	2.1913	.9554	-22.1	552.9	13.709	7.61	11.55	1824.
60.	.01292	2.1432	.9323	-5.3	576.2	14.104	7.67	11.73	1811.
65.	.01329	2.0456	.8749	37.7	635.9	15.058	7.83	12.13	1780.
70.	.01368	1.9626	.8202	82.0	697.5	15.972	8.04	12.53	1749.
75.	.01407	1.8870	.7692	127.8	761.2	16.851	8.30	12.96	1716.
80.	.01448	1.8198	.7219	175.3	827.1	17.701	8.60	13.41	1684.
85.	.01491	1.7672	.6782	224.5	895.3	18.528	8.95	13.86	1655.
90.	.01534	1.7229	.6379	275.6	965.8	19.333	9.32	14.32	1627.
95.	.01578	1.6938	.6010	328.5	1038.4	20.119	9.70	14.74	1604.
100.	.01622	1.6639	.5671	383.3	1113.3	20.887	10.09	15.18	1582.
110.	.01713	1.6143	.5082	500.1	1271.0	22.388	10.94	16.10	1542.
120.	.01806	1.5871	.4586	622.5	1435.4	23.819	11.61	16.80	1515.
130.	.01901	1.5796	.4165	750.3	1605.9	25.183	12.14	17.30	1500.
140.	.01997	1.5823	.3806	881.9	1780.5	26.477	12.52	17.53	1493.
160.	.02190	1.6082	.3236	1150.6	2135.9	28.850	12.85	17.85	1494.
180.	.02382	1.6518	.2807	1419.1	2491.2	30.942	12.79	17.66	1510.
200.	.02575	1.7050	.2477	1681.8	2840.6	32.783	12.52	17.29	1535.
220.	.02768	1.7654	.2215	1936.6	3182.0	34.410	12.19	16.87	1563.
240.	.02959	1.8336	.2000	2183.3	3515.0	35.859	11.87	16.46	1594.
260.	.03150	1.9071	.1821	2422.8	3840.2	37.161	11.60	16.09	1626.
280.	.03338	1.9838	.1669	2656.3	4158.5	38.340	11.39	15.77	1657.
300.	.03536	2.0602	.1559	2874.0	4465.2	39.380	11.05	15.48	1698.
350.	.04006	2.2557	.1316	3425.3	5228.2	41.732	10.77	15.09	1778.
400.	.04473	2.4537	.1141	3964.0	5976.9	43.733	10.64	14.88	1853.
450.	.04937	2.6528	.1008	4496.0	6717.7	45.479	10.58	14.78	1925.
500.	.05399	2.8526	.0903	5025.5	7455.1	47.032	10.55	14.71	1995.
550.	.05860	3.0529	.0818	5552.6	8189.7	48.432	10.54	14.68	2062.
600.	.06320	3.2536	.0749	6079.4	8923.4	49.707	10.54	14.67	2128.
700.	.07238	3.6562	.0640	7132.9	10390.1	51.970	10.57	14.68	2253.
800.	.08155	4.0600	.0559	8191.5	11861.1	53.933	10.65	14.75	2371.
900.	.09071	4.4649	.0497	9259.2	13341.1	55.674	10.76	14.86	2483.
1000.	.09986	4.8708	.0447	10339.8	14833.6	57.249	10.91	15.01	2588.
1200.	.11817	5.6849	.0373	12554.7	17872.4	60.006	11.29	15.38	2783.
1400.	.13648	6.5012	.0320	14850.3	20991.9	62.415	11.72	15.81	2962.
1600.	.15479	7.3191	.0280	17230.5	24196.1	64.531	12.13	16.22	3129.
1800.	.17310	8.1383	.0249	19695.2	27484.8	66.430	12.50	16.50	3287.
2000.	.19142	8.9584	.0224	22244.5	30858.5	68.273	12.89	16.99	3437.
2200.	.20976	9.7793	.0204	24872.5	34311.6	70.591	13.32	17.43	3578.
2400.	.22814	10.6007	.0187	27596.2	37862.3	73.181	13.84	17.98	3711.
2600.	.24660	11.4226	.0172	30441.1	41537.9	75.956	14.52	18.71	3836.
2800.	.26521	12.2448	.0160	33446.9	45381.5	78.776	15.42	19.59	3954.
3000.	.28410	13.0674	.0149	36668.5	49452.7	81.481	16.61	21.02	4065.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

45.00 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	24.742	92.3840	1749.4	.23071	301.5396	.00414	188.97	534.95	.00102	1.30639	2.0519
	25.	92.2852	1754.5	.22980	300.3381	.00416	189.95	521.85	.00102	1.30603	2.0045
	26.	91.8995	1773.8	.22639	295.6654	.00422	193.31	476.31	.00101	1.30464	1.8431
	27.	91.5102	1792.2	.22310	290.9811	.00427	196.11	437.86	.00101	1.30323	1.7103
	28.	91.1173	1809.6	.21993	286.2917	.00433	198.43	405.09	.00100	1.30182	1.5998
	29.	90.7211	1825.6	.21695	281.6032	.00439	200.33	376.93	.00099	1.30039	1.5065
	30.	90.3216	1839.6	.21423	276.9220	.00444	201.86	352.54	.00098	1.29895	1.4267
	31.	89.9189	1853.2	.21154	272.2539	.00450	202.31	331.26	.00097	1.29750	1.3640
	32.	89.5132	1866.0	.20895	267.6047	.00455	202.52	312.59	.00096	1.29604	1.3102
	33.	89.1045	1877.4	.20652	262.9803	.00460	202.52	296.09	.00095	1.29457	1.2633
	34.	88.6930	1887.9	.20419	258.3862	.00466	202.40	281.45	.00093	1.29309	1.2222
	35.	88.2787	1897.6	.20195	253.8280	.00471	202.13	268.38	.00092	1.29160	1.1863
	36.	87.8617	1906.6	.19979	249.3110	.00476	201.72	256.65	.00091	1.29010	1.1549
	37.	87.4422	1914.8	.19771	244.8403	.00481	201.20	246.09	.00090	1.28860	1.1272
	38.	87.0201	1921.9	.19578	240.4212	.00486	200.58	236.54	.00089	1.28709	1.1026
	39.	86.5955	1927.6	.19403	236.0586	.00492	199.87	227.86	.00088	1.28557	1.0803
	40.	86.1687	1932.6	.19235	231.7573	.00497	199.09	219.96	.00087	1.28404	1.0604
	42.	85.3086	1942.3	.18901	223.3571	.00507	197.28	206.09	.00085	1.28097	1.0278
	44.	84.4405	1952.4	.18560	215.2561	.00516	195.30	194.34	.00083	1.27787	1.0027
	46.	83.5657	1969.2	.18132	207.4866	.00525	193.20	184.27	.00080	1.27475	.9865
	48.	82.6853	1983.3	.17749	200.0778	.00534	191.04	175.55	.00079	1.27162	.9728
	50.	81.8007	1997.0	.17381	193.0548	.00542	188.86	167.94	.00077	1.26848	.9619
	52.	80.9135	2010.7	.17026	186.4382	.00549	186.67	161.22	.00075	1.26533	.9529
	54.	80.0086	2040.1	.16712	182.3746	.00549	184.44	155.17	.00074	1.26213	.9429
	56.	79.1301	2054.2	.16370	176.3816	.00555	182.36	149.90	.00073	1.25903	.9369
	58.	78.2527	2073.7	.16046	171.4717	.00557	180.33	145.15	.00072	1.25593	.9300
	60.	77.3824	2086.5	.15717	165.8425	.00562	178.63	140.87	.00071	1.25286	.9250
	65.	75.2269	2133.5	.14849	153.8824	.00569	175.46	131.74	.00069	1.24529	.9108
	70.	73.1119	2192.1	.13950	143.4871	.00572	172.60	124.33	.00068	1.23789	.9027
	75.	71.0481	2258.8	.13042	134.0696	.00574	170.14	118.20	.00067	1.23069	.9002
	80.	69.0373	2334.1	.12151	125.6357	.00575	168.20	113.03	.00065	1.22371	.9012
	85.	67.0851	2423.4	.11299	118.5543	.00572	169.41	108.62	.00066	1.21696	.8888
	90.	65.1997	2521.2	.10501	112.3300	.00568	170.71	104.86	.00066	1.21046	.8795
	95.	63.3895	2634.2	.09770	107.3672	.00560	172.17	101.66	.00066	1.20424	.8707
	100.	61.6472	2745.7	.09113	102.5731	.00553	173.82	98.93	.00067	1.19827	.8640
	110.	58.3738	2985.7	.07960	94.2308	.00539	180.36	87.55	.00069	1.18711	.7817
	120.	55.3571	3217.9	.07137	87.8588	.00522	182.40	86.38	.00071	1.17690	.7955
	130.	52.5953	3450.5	.06524	83.0802	.00501	187.44	85.73	.00074	1.16759	.7911
	140.	50.0760	3669.5	.06073	79.2331	.00480	192.67	85.43	.00079	1.15915	.7817
	160.	45.6714	4050.6	.05513	73.4478	.00441	200.50	85.61	.00089	1.14449	.7620
	180.	41.9732	4361.9	.05231	69.3320	.00405	204.66	86.57	.00099	1.13228	.7471
	200.	38.8312	4622.3	.05095	66.2089	.00374	206.72	88.11	.00111	1.12197	.7371
	220.	36.1318	4859.2	.05029	63.7886	.00347	208.12	90.10	.00123	1.11317	.7303
	240.	33.7920	5098.1	.04986	61.9605	.00323	209.72	92.42	.00136	1.10558	.7253
	260.	31.7500	5349.7	.04943	60.5518	.00301	211.93	94.99	.00149	1.09899	.7211
	280.	29.9569	5615.0	.04892	59.4287	.00281	214.90	97.74	.00164	1.09322	.7173
	300.	28.2816	5785.2	.04986	58.2664	.00268	218.61	100.62	.00180	1.08785	.7124
	350.	24.9599	6451.9	.04898	56.3024	.00234	230.56	108.20	.00220	1.07726	.7080
	400.	22.3557	7155.0	.04798	54.8534	.00208	245.10	116.03	.00265	1.06900	.7045
	450.	20.2547	7880.0	.04703	53.7312	.00188	261.02	123.93	.00314	1.06238	.7017
	500.	18.5211	8609.0	.04622	52.8327	.00171	277.56	131.79	.00367	1.05693	.6987
	550.	17.0646	9344.3	.04552	52.0962	.00157	294.34	139.58	.00423	1.05237	.6961
	600.	15.8228	10084.1	.04491	51.4811	.00145	311.17	147.26	.00483	1.04850	.6940
	700.	13.8159	11584.2	.04383	50.5130	.00127	344.82	162.28	.00612	1.04225	.6909
	800.	12.2628	13124.6	.04285	49.7869	.00112	378.57	176.85	.00754	1.03744	.6889
	900.	11.0245	14717.4	.04188	49.2236	.00101	412.67	190.99	.00907	1.03362	.6877
	1000.	10.0136	16370.2	.04092	48.7748	.00092	447.31	204.74	.01072	1.03050	.6869
	1200.	8.4622	19855.7	.03901	48.1065	.00077	511.13	231.24	.01414	1.02573	.6958
	1400.	7.3271	23571.5	.03722	47.6344	.00067	583.31	256.59	.01813	1.02225	.6955
	1600.	6.4604	27428.1	.03570	47.2842	.00059	655.34	280.95	.02251	1.01960	.6955
	1800.	5.7769	31388.6	.03443	47.0144	.00053	726.96	304.43	.02728	1.01751	.6953
	2000.	5.2241	35522.9	.03325	46.7994	.00048	800.69	327.08	.03247	1.01583	.6942
	2200.	4.7674	39921.6	.03207	46.6216	.00044	880.24	344.88	.03813	1.01444	.6831
	2400.	4.3834	44753.6	.03077	46.4667	.00040	972.07	366.21	.04440	1.01327	.6774
	2600.	4.0552	50267.8	.02928	46.3210	.00037	1085.58	387.07	.05152	1.01227	.6670
	2800.	3.7705	56787.1	.02753	46.1698	.00035	1232.87	407.59	.05978	1.01141	.6510
	3000.	3.5199	64685.0	.02556	45.9966	.00032	1427.99	427.88	.06949	1.01065	.6298

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

50.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 25.708	.01069	3.4533	1.278	-247.9	286.8	5.798	5.94	7.33	2064.
26.	.01071	3.4430	1.278	-246.4	289.0	5.881	5.97	7.38	2063.
27.	.01075	3.4072	1.275	-241.0	296.4	6.163	6.07	7.56	2060.
28.	.01079	3.3711	1.271	-235.6	304.1	6.441	6.17	7.73	2056.
29.	.01084	3.3346	1.267	-230.0	311.9	6.715	6.26	7.90	2051.
30.	.01088	3.2980	1.262	-224.2	319.9	6.986	6.34	8.06	2047.
31.	.01093	3.2612	1.256	-218.4	328.0	7.252	6.42	8.21	2042.
32.	.01097	3.2242	1.250	-212.4	336.3	7.515	6.50	8.37	2037.
33.	.01102	3.1872	1.243	-206.3	344.7	7.775	6.57	8.51	2032.
34.	.01107	3.1501	1.236	-200.1	353.3	8.032	6.64	8.66	2027.
35.	.01112	3.1131	1.229	-193.8	362.0	8.285	6.70	8.80	2022.
36.	.01117	3.0761	1.221	-187.4	370.9	8.534	6.76	8.94	2016.
37.	.01122	3.0393	1.213	-180.9	379.9	8.781	6.82	9.07	2011.
38.	.01127	3.0027	1.205	-174.3	389.1	9.025	6.87	9.20	2005.
39.	.01132	2.9663	1.196	-167.6	398.3	9.265	6.91	9.32	2000.
40.	.01137	2.9302	1.187	-160.8	407.7	9.503	6.95	9.44	1994.
42.	.01148	2.8590	1.168	-147.0	426.8	9.969	7.03	9.67	1983.
44.	.01159	2.7895	1.149	-132.9	446.4	10.424	7.11	9.90	1971.
46.	.01170	2.7220	1.129	-119.0	465.9	10.858	7.22	10.16	1958.
48.	.01181	2.6570	1.108	-104.2	486.5	11.295	7.31	10.40	1945.
50.	.01193	2.5948	1.087	-89.0	507.5	11.725	7.39	10.63	1932.
52.	.01205	2.5356	1.065	-73.6	529.0	12.146	7.46	10.84	1919.
54.	.01217	2.4797	1.043	-57.9	550.9	12.559	7.53	11.05	1907.
56.	.01230	2.4274	1.021	-41.6	573.4	12.969	7.60	11.24	1895.
58.	.01243	2.4097	1.002	-25.3	596.3	13.371	7.65	11.39	1893.
60.	.01256	2.3577	.9796	-8.9	619.3	13.760	7.71	11.57	1880.
65.	.01290	2.2638	.9248	33.3	678.1	14.701	7.89	11.97	1854.
70.	.01324	2.1798	.8710	76.9	738.9	15.602	8.10	12.37	1824.
75.	.01360	2.1048	.8199	122.0	801.8	16.470	8.36	12.79	1794.
80.	.01396	2.0360	.7723	168.8	866.9	17.310	8.67	13.24	1763.
85.	.01433	1.9734	.7280	217.5	934.2	18.126	9.02	13.71	1732.
90.	.01472	1.9221	.6869	268.0	1003.9	18.923	9.39	14.18	1703.
95.	.01511	1.8810	.6489	320.6	1076.0	19.702	9.78	14.63	1678.
100.	.01550	1.8546	.6139	375.0	1150.2	20.464	10.17	15.05	1657.
110.	.01631	1.7960	.5528	491.2	1306.8	21.954	11.01	15.99	1615.
120.	.01714	1.7591	.5009	613.2	1470.1	23.376	11.68	16.70	1586.
130.	.01798	1.7400	.4566	740.8	1639.9	24.734	12.20	17.24	1568.
140.	.01883	1.7337	.4184	872.3	1814.0	26.024	12.58	17.60	1557.
160.	.02055	1.7491	.3569	1141.3	2169.0	28.394	12.91	17.84	1554.
180.	.02228	1.7838	.3103	1410.3	2524.2	30.487	12.85	17.67	1566.
200.	.02400	1.8323	.2740	1673.6	2873.8	32.328	12.58	17.30	1588.
220.	.02573	1.8865	.2453	1929.1	3215.4	33.956	12.24	16.89	1613.
240.	.02744	1.9485	.2218	2176.6	3548.8	35.406	11.92	16.49	1641.
260.	.02916	2.0170	.2022	2417.1	3874.8	36.712	11.66	16.14	1671.
280.	.03085	2.0909	.1856	2651.7	4194.4	37.896	11.45	15.83	1701.
300.	.03263	2.1638	.1730	2869.1	4500.4	38.932	11.09	15.51	1739.
350.	.03686	2.3550	.1461	3421.8	5264.8	41.288	10.80	15.11	1815.
400.	.04106	2.5498	.1266	3961.6	6014.6	43.292	10.66	14.90	1888.
450.	.04523	2.7463	.1118	4494.7	6756.4	45.040	10.60	14.79	1957.
500.	.04939	2.9440	.1002	5024.9	7494.5	46.594	10.57	14.73	2025.
550.	.05354	3.1424	.0908	5552.7	8229.6	47.996	10.56	14.69	2091.
600.	.05767	3.3414	.0830	6080.1	8963.7	49.272	10.55	14.67	2155.
700.	.06593	3.7411	.0710	7134.5	10431.0	51.535	10.58	14.68	2278.
800.	.07417	4.1425	.0620	8193.7	11902.4	53.498	10.66	14.75	2394.
900.	.08241	4.5453	.0551	9262.0	13382.5	55.240	10.77	14.86	2504.
1000.	.09065	4.9494	.0496	10342.9	14875.2	56.815	10.92	15.01	2608.
1200.	.10711	5.7604	.0413	12558.4	17914.0	59.572	11.30	15.38	2801.
1400.	.12358	6.5743	.0354	14854.4	21033.4	61.981	11.72	15.81	2978.
1600.	.14005	7.3904	.0310	17234.9	24237.5	64.097	12.13	16.22	3143.
1800.	.15653	8.2080	.0276	19699.7	27526.1	65.996	12.51	16.60	3301.
2000.	.17301	9.0268	.0248	22248.8	30899.3	67.839	12.89	16.99	3449.
2200.	.18951	9.8465	.0226	24875.9	34351.2	70.156	13.32	17.43	3590.
2400.	.20604	10.6670	.0207	27597.0	37899.0	72.745	13.83	17.96	3722.
2600.	.22264	11.4881	.0191	30436.0	41568.2	75.517	14.48	18.66	3847.
2800.	.23938	12.3096	.0178	33430.5	45399.7	78.333	15.35	19.61	3965.
3000.	.25635	13.1315	.0166	36632.2	49449.7	81.030	16.50	20.88	4076.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

50.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 25.708	93.5095	1851.7	.23018	322.9196	.00396	198.99	567.99	.00105	1.31046	2.0921
26.	93.4012	1858.0	.22917	321.5761	.00397	199.98	552.43	.00104	1.31007	2.0392
27.	93.0286	1879.3	.22574	316.9646	.00402	202.99	504.76	.00104	1.30872	1.8795
28.	92.6530	1899.6	.22244	312.3381	.00407	205.49	464.37	.00103	1.30736	1.7471
29.	92.2745	1918.3	.21935	307.7025	.00412	207.56	429.87	.00103	1.30600	1.6357
30.	91.8933	1935.1	.21652	303.0638	.00416	209.24	400.14	.00102	1.30462	1.5407
31.	91.5094	1951.3	.21374	298.4278	.00421	209.79	374.34	.00100	1.30323	1.4655
32.	91.1229	1966.5	.21107	293.8000	.00425	210.09	351.80	.00099	1.30184	1.4010
33.	90.7340	1980.3	.20857	289.1859	.00430	210.16	331.98	.00098	1.30043	1.3450
34.	90.3427	1993.2	.20617	284.5909	.00434	210.11	314.46	.00097	1.29902	1.2959
35.	89.9491	2005.2	.20387	280.0202	.00439	209.90	298.88	.00095	1.29761	1.2530
36.	89.5533	2016.2	.20166	275.4789	.00443	209.55	284.97	.00094	1.29618	1.2154
37.	89.1553	2026.5	.19954	270.9719	.00448	209.07	272.48	.00093	1.29475	1.1822
38.	88.7551	2035.5	.19757	266.5040	.00452	208.49	261.23	.00092	1.29331	1.1527
39.	88.3530	2042.9	.19579	262.0800	.00456	207.81	251.05	.00091	1.29187	1.1260
40.	87.9489	2049.5	.19409	257.7042	.00461	207.06	241.80	.00090	1.29042	1.1023
42.	87.1352	2062.2	.19072	249.1153	.00469	205.29	225.65	.00088	1.28750	1.0630
44.	86.3146	2075.1	.18728	240.7706	.00477	203.33	212.06	.00086	1.28456	1.0326
46.	85.4880	2094.8	.18300	232.7010	.00485	201.25	200.49	.00083	1.28161	1.0123
48.	84.6562	2111.2	.17917	224.9347	.00493	199.09	190.53	.00081	1.27864	.9953
50.	83.8203	2126.7	.17552	217.4966	.00500	196.89	181.87	.00080	1.27566	.9816
52.	82.9812	2141.7	.17200	210.4081	.00506	194.68	174.28	.00078	1.27267	.9707
54.	82.1403	2156.9	.16857	203.6869	.00512	192.48	167.58	.00076	1.26969	.9618
56.	81.2989	2172.1	.16527	197.3461	.00517	190.32	161.62	.00075	1.26670	.9543
58.	80.4310	2203.2	.16274	193.8173	.00517	188.12	156.13	.00074	1.26363	.9452
60.	79.6003	2216.3	.15952	187.6705	.00522	186.36	151.37	.00073	1.26069	.9396
65.	77.5440	2272.4	.15120	175.5411	.00527	183.08	141.30	.00071	1.25343	.9239
70.	75.5271	2338.7	.14234	164.6374	.00529	180.12	133.23	.00069	1.24634	.9152
75.	73.5548	2415.4	.13327	154.8164	.00530	177.53	126.58	.00068	1.23944	.9121
80.	71.6309	2500.3	.12432	145.8433	.00530	175.47	121.00	.00067	1.23272	.9129
85.	69.7620	2592.3	.11572	137.6651	.00529	176.68	116.25	.00067	1.22622	.9020
90.	67.9453	2695.2	.10766	130.5979	.00526	177.93	112.16	.00067	1.21993	.8936
95.	66.1884	2807.4	.10027	124.5019	.00521	179.32	108.64	.00067	1.21386	.8865
100.	64.4956	2933.1	.09360	119.6114	.00513	180.91	105.61	.00067	1.20803	.8788
110.	61.3053	3184.6	.08190	110.1069	.00502	186.53	99.67	.00069	1.19710	.7771
120.	58.3468	3422.5	.07353	102.6367	.00488	188.26	89.59	.00070	1.18702	.7949
130.	55.6103	3653.6	.06728	96.7603	.00472	193.61	88.98	.00073	1.17775	.7923
140.	53.0937	3871.4	.06263	92.0502	.00455	199.36	88.69	.00077	1.16927	.7828
160.	48.6518	4252.8	.05681	85.0971	.00419	208.19	88.78	.00086	1.15439	.7606
180.	44.8845	4559.2	.05381	80.0658	.00388	212.84	89.56	.00097	1.14188	.7434
200.	41.6582	4818.3	.05231	76.3289	.00359	214.84	90.88	.00107	1.13124	.7318
220.	38.8704	5047.7	.05155	73.3272	.00335	215.80	92.65	.00118	1.12210	.7249
240.	36.4373	5277.2	.05106	70.9973	.00312	216.76	94.75	.00130	1.11416	.7208
260.	34.2992	5520.7	.05058	69.1826	.00292	218.27	97.12	.00142	1.10722	.7181
280.	32.4108	5783.2	.05002	67.7689	.00274	220.55	99.69	.00155	1.10112	.7157
300.	30.6495	5945.2	.05089	66.3210	.00261	223.61	102.41	.00169	1.09544	.7102
350.	27.1292	6608.2	.04986	63.8894	.00229	234.25	109.66	.00206	1.08417	.7074
400.	24.3547	7309.7	.04875	62.0985	.00204	247.86	117.24	.00246	1.07534	.7049
450.	22.1071	8034.1	.04769	60.7131	.00184	263.13	124.94	.00290	1.06822	.7025
500.	20.2464	8762.7	.04681	59.6048	.00168	279.22	132.66	.00337	1.06235	.6997
550.	18.6789	9497.6	.04605	58.6964	.00155	295.67	140.33	.00388	1.05743	.6972
600.	17.3392	10237.1	.04538	57.9379	.00143	312.27	147.92	.00442	1.05323	.6950
700.	15.1678	11736.6	.04422	56.7441	.00125	345.60	162.80	.00559	1.04646	.6917
800.	13.4820	13276.7	.04317	55.8489	.00111	379.16	177.27	.00686	1.04122	.6896
900.	12.1343	14869.3	.04216	55.1545	.00100	413.14	191.34	.00825	1.03704	.6882
1000.	11.0320	16522.3	.04115	54.6014	.00091	447.69	205.04	.00973	1.03364	.6874
1200.	9.3359	20008.9	.03920	53.7787	.00077	511.13	231.47	.01281	1.02842	.6965
1400.	8.0919	23726.5	.03737	53.1985	.00067	583.31	256.77	.01641	1.02460	.6960
1600.	7.1402	27584.6	.03582	52.7687	.00059	655.33	281.10	.02037	1.02168	.6958
1800.	6.3887	31545.5	.03453	52.4382	.00053	726.90	304.55	.02467	1.01938	.6956
2000.	5.7801	35676.9	.03335	52.1754	.00048	800.46	327.19	.02934	1.01752	.6945
2200.	5.2769	40064.6	.03216	51.9590	.00043	879.51	344.88	.03443	1.01599	.6833
2400.	4.8535	44868.6	.03088	51.7719	.00040	970.19	366.21	.04007	1.01470	.6779
2600.	4.4915	50325.1	.02941	51.5984	.00037	1081.42	387.07	.04644	1.01360	.6680
2800.	4.1774	56740.6	.02771	51.4221	.00035	1224.67	407.57	.05382	1.01264	.6527
3000.	3.9009	64470.2	.02578	51.2248	.00032	1413.28	427.84	.06246	1.01180	.6322

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

55.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 26.646	.01057	3.6392	1.307	-240.0	341.5	5.856	6.01	7.41	2118.
27.	.01059	3.6271	1.305	-238.2	344.1	5.954	6.05	7.47	2117.
28.	.01063	3.5926	1.302	-232.9	351.7	6.229	6.15	7.64	2113.
29.	.01067	3.5577	1.298	-227.4	359.4	6.500	6.24	7.81	2109.
30.	.01071	3.5225	1.293	-221.8	367.3	6.767	6.33	7.96	2105.
31.	.01075	3.4871	1.288	-216.1	375.3	7.031	6.41	8.11	2101.
32.	.01080	3.4514	1.282	-210.3	383.5	7.291	6.49	8.26	2097.
33.	.01084	3.4156	1.275	-204.4	391.9	7.547	6.56	8.41	2092.
34.	.01088	3.3796	1.268	-198.3	400.3	7.800	6.63	8.55	2087.
35.	.01093	3.3436	1.261	-192.2	409.0	8.050	6.70	8.69	2082.
36.	.01097	3.3076	1.254	-185.9	417.7	8.297	6.76	8.82	2077.
37.	.01102	3.2716	1.246	-179.5	426.6	8.540	6.82	8.95	2072.
38.	.01107	3.2357	1.238	-173.1	435.6	8.781	6.87	9.07	2067.
39.	.01111	3.1999	1.229	-166.5	444.7	9.018	6.92	9.19	2062.
40.	.01116	3.1643	1.221	-159.9	454.0	9.252	6.96	9.31	2057.
42.	.01126	3.0937	1.203	-146.4	472.8	9.712	7.04	9.53	2046.
44.	.01136	3.0244	1.184	-132.6	492.1	10.160	7.12	9.75	2035.
46.	.01146	2.9566	1.165	-119.0	511.3	10.587	7.23	10.01	2022.
48.	.01157	2.8906	1.145	-104.6	531.6	11.018	7.33	10.24	2010.
50.	.01167	2.8269	1.125	-89.7	552.3	11.440	7.41	10.46	1997.
52.	.01178	2.7656	1.104	-74.6	573.4	11.855	7.50	10.68	1985.
54.	.01189	2.7071	1.083	-59.2	595.0	12.262	7.57	10.88	1972.
56.	.01201	2.6515	1.061	-43.3	617.2	12.666	7.64	11.07	1960.
58.	.01213	2.5990	1.040	-27.4	639.5	13.058	7.70	11.25	1948.
60.	.01224	2.5499	1.018	-11.3	662.2	13.442	7.76	11.42	1937.
65.	.01255	2.4754	.9691	30.2	720.6	14.377	7.94	11.83	1920.
70.	.01287	2.3895	.9170	73.1	780.8	15.269	8.16	12.24	1893.
75.	.01319	2.3173	.8665	117.6	843.1	16.129	8.43	12.65	1865.
80.	.01352	2.2438	.8187	163.9	907.5	16.959	8.74	13.10	1835.
85.	.01386	2.1803	.7743	212.0	974.1	17.767	9.08	13.57	1805.
90.	.01420	2.1219	.7327	262.1	1043.2	18.556	9.46	14.05	1775.
95.	.01455	2.0737	.6939	314.3	1114.6	19.329	9.85	14.52	1748.
100.	.01491	2.0336	.6579	368.4	1188.4	20.085	10.24	14.97	1724.
110.	.01564	1.9786	.5940	484.0	1344.1	21.568	11.08	15.88	1684.
120.	.01638	1.9310	.5405	605.6	1506.4	22.980	11.74	16.51	1653.
130.	.01714	1.9015	.4945	732.8	1675.3	24.331	12.27	17.18	1632.
140.	.01790	1.8884	.4545	864.3	1849.0	25.618	12.65	17.55	1619.
160.	.01945	1.8907	.3891	1133.4	2203.4	27.984	12.98	17.82	1612.
180.	.02102	1.9181	.3390	1402.8	2558.6	30.077	12.90	17.67	1620.
200.	.02257	1.9596	.2998	1666.6	2908.2	31.918	12.63	17.30	1638.
220.	.02413	2.0095	.2685	1922.6	3250.0	33.547	12.29	16.89	1662.
240.	.02569	2.0648	.2431	2170.8	3583.6	34.998	11.97	16.51	1687.
260.	.02724	2.1280	.2220	2412.0	3910.1	36.305	11.71	16.17	1715.
280.	.02878	2.1975	.2039	2647.4	4230.4	37.493	11.50	15.89	1743.
300.	.03039	2.2687	.1899	2864.7	4536.1	38.526	11.13	15.53	1780.
350.	.03424	2.4553	.1605	3418.7	5301.8	40.886	10.83	15.13	1852.
400.	.03805	2.6466	.1390	3959.7	6052.6	42.893	10.69	14.92	1922.
450.	.04185	2.8404	.1228	4493.7	6795.2	44.643	10.63	14.81	1989.
500.	.04562	3.0358	.1100	5024.8	7534.0	46.199	10.59	14.74	2055.
550.	.04939	3.2322	.0997	5553.2	8269.6	47.601	10.58	14.70	2120.
600.	.05315	3.4294	.0912	6081.1	9004.1	48.878	10.57	14.68	2182.
700.	.06065	3.8259	.0779	7136.4	10471.9	51.142	10.60	14.69	2302.
800.	.06813	4.2247	.0681	8196.3	11943.6	53.106	10.67	14.75	2416.
900.	.07562	4.6252	.0605	9265.1	13423.9	54.848	10.79	14.86	2524.
1000.	.08310	5.0272	.0545	10346.4	14916.7	56.423	10.94	15.01	2627.
1200.	.09805	5.8349	.0454	12562.5	17955.5	59.180	11.31	15.38	2817.
1400.	.11302	6.6462	.0389	14858.9	21074.8	61.588	11.73	15.81	2993.
1600.	.12798	7.4601	.0341	17239.8	24278.8	63.705	12.14	16.22	3157.
1800.	.14295	8.2760	.0303	19704.7	27567.1	65.603	12.51	16.60	3313.
2000.	.15793	9.0933	.0273	22253.7	30939.9	67.446	12.90	16.99	3461.
2200.	.17292	9.9118	.0248	24880.0	34390.8	69.762	13.31	17.42	3601.
2400.	.18795	10.7312	.0228	27599.0	37936.0	72.351	13.81	17.94	3733.
2600.	.20303	11.5513	.0210	30433.0	41599.8	75.121	14.46	18.62	3858.
2800.	.21824	12.3721	.0195	33417.7	45420.8	77.933	15.30	19.54	3975.
3000.	.23364	13.1933	.0182	36602.2	49452.5	80.624	16.40	20.77	4087.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

55.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 26.646	94.5778	1952.1	.22975	344.1862	.00380	208.55	601.68	.00107	1.31434	2.1378
27.	94.4505	1960.6	.22849	342.5778	.00381	209.63	581.97	.00107	1.31388	2.0742
28.	94.0893	1983.8	.22505	338.0217	.00385	212.31	532.32	.00106	1.31257	1.9159
29.	93.7257	2005.4	.22183	333.4476	.00389	214.53	490.14	.00106	1.31125	1.7832
30.	93.3597	2024.8	.21889	328.8612	.00393	216.35	454.00	.00105	1.30992	1.6705
31.	92.9915	2043.6	.21600	324.2682	.00397	217.00	422.79	.00104	1.30859	1.5810
32.	92.6212	2061.4	.21324	319.6741	.00401	217.38	395.65	.00102	1.30725	1.5042
33.	92.2489	2077.6	.21065	315.0841	.00405	217.52	371.90	.00101	1.30590	1.4376
34.	91.8746	2092.8	.20818	310.5035	.00409	217.54	350.98	.00100	1.30455	1.3794
35.	91.4983	2107.1	.20581	305.9372	.00412	217.38	332.47	.00098	1.30319	1.3285
36.	91.1202	2120.3	.20354	301.3902	.00416	217.07	315.99	.00097	1.30183	1.2839
37.	90.7403	2132.7	.20137	296.8672	.00420	216.63	301.26	.00096	1.30046	1.2447
38.	90.3586	2143.7	.19934	292.3729	.00423	216.07	288.03	.00095	1.29908	1.2097
39.	89.9752	2152.8	.19752	287.9117	.00427	215.42	276.09	.00094	1.29770	1.1781
40.	89.5903	2161.2	.19578	283.4879	.00431	214.69	265.29	.00093	1.29631	1.1499
42.	88.8157	2177.1	.19235	274.7696	.00438	212.95	246.52	.00091	1.29353	1.1033
44.	88.0353	2193.1	.18887	266.2499	.00445	211.01	230.82	.00088	1.29073	1.0669
46.	87.2498	2216.1	.18455	257.9587	.00452	208.92	217.52	.00086	1.28791	1.0419
48.	86.4597	2235.2	.18071	249.9233	.00458	206.76	206.14	.00084	1.28508	1.0210
50.	85.6657	2253.1	.17705	242.1683	.00464	204.54	196.31	.00082	1.28224	1.0042
52.	84.8687	2270.1	.17353	234.7155	.00470	202.30	187.73	.00080	1.27940	.9907
54.	84.0695	2286.8	.17011	227.5835	.00476	200.08	180.19	.00079	1.27655	.9798
56.	83.2691	2303.1	.16683	220.7875	.00481	197.88	173.51	.00077	1.27370	.9708
58.	82.4687	2318.6	.16374	214.3387	.00485	195.73	167.55	.00076	1.27085	.9629
60.	81.6692	2335.7	.16060	208.2446	.00489	193.90	162.21	.00075	1.26801	.9553
65.	79.6560	2406.1	.15324	197.1767	.00491	190.35	150.86	.00073	1.25088	.9372
70.	77.7140	2478.4	.14461	185.6980	.00494	187.23	142.00	.00071	1.25403	.9281
75.	75.8132	2565.5	.13565	175.6818	.00493	184.50	134.76	.00069	1.24735	.9242
80.	73.9677	2656.4	.12670	165.9722	.00493	182.32	128.76	.00068	1.24088	.9254
85.	72.1689	2758.0	.11810	157.3462	.00492	183.52	123.66	.00067	1.23460	.9145
90.	70.4197	2865.4	.11000	149.4223	.00490	184.76	119.28	.00067	1.22851	.9072
95.	68.7183	2982.1	.10252	142.5027	.00487	186.10	115.48	.00067	1.22261	.9010
100.	67.0733	3104.5	.09576	136.4020	.00482	187.64	112.18	.00067	1.21691	.8951
110.	63.9504	3382.0	.08382	126.5290	.00469	192.14	93.47	.00068	1.20616	.7723
120.	61.0551	3624.0	.07538	117.8980	.00458	193.60	92.51	.00069	1.19625	.7938
130.	58.3594	3854.9	.06906	110.9705	.00446	199.32	91.98	.00072	1.18706	.7927
140.	55.8554	4074.1	.06434	105.4773	.00431	205.68	91.74	.00076	1.17858	.7829
160.	51.4027	4452.2	.05833	97.1866	.00400	215.75	91.81	.00085	1.16359	.7585
180.	47.5849	4757.1	.05520	91.2726	.00371	221.17	92.48	.00095	1.15084	.7387
200.	44.2982	5011.1	.05357	86.8068	.00345	223.35	93.63	.00105	1.13994	.7254
220.	41.4370	5238.2	.05271	83.2688	.00322	224.02	95.20	.00115	1.13051	.7178
240.	38.9298	5457.9	.05215	80.3804	.00302	224.43	97.11	.00126	1.12229	.7143
260.	36.7130	5692.8	.05164	78.1244	.00284	225.25	99.29	.00137	1.11506	.7129
280.	34.7442	5947.8	.05105	76.3489	.00267	226.82	101.69	.00148	1.10866	.7122
300.	32.9061	6104.8	.05188	74.6540	.00254	229.20	104.25	.00161	1.10272	.7065
350.	29.2084	6764.3	.05071	71.7146	.00224	238.40	111.17	.00194	1.09082	.7057
400.	26.2794	7464.3	.04949	69.5512	.00200	250.97	118.50	.00230	1.08146	.7045
450.	23.8972	8188.1	.04834	67.8786	.00181	265.51	126.01	.00270	1.07388	.7028
500.	21.9189	8916.3	.04738	66.5409	.00165	281.08	133.57	.00313	1.06762	.7004
550.	20.2477	9651.0	.04655	65.4444	.00152	297.17	141.12	.00359	1.06236	.6980
600.	18.8162	10390.2	.04583	64.5288	.00141	313.49	148.61	.00409	1.05786	.6959
700.	16.4894	11889.1	.04459	63.0873	.00124	346.47	163.35	.00515	1.05058	.6925
800.	14.6771	13428.8	.04348	62.0060	.00110	379.80	177.72	.00632	1.04493	.6903
900.	13.2248	15021.2	.04242	61.1673	.00099	413.64	191.72	.00758	1.04042	.6888
1000.	12.0343	16674.3	.04138	60.4995	.00090	448.10	205.36	.00893	1.03674	.6879
1200.	10.1984	20161.8	.03937	59.5066	.00076	511.13	231.71	.01173	1.03107	.6972
1400.	8.8483	23880.8	.03751	58.8073	.00066	583.31	256.97	.01501	1.02692	.6964
1600.	7.8136	27740.2	.03593	58.2902	.00058	655.32	281.26	.01861	1.02374	.6962
1800.	6.9953	31701.4	.03463	57.8931	.00052	726.85	304.69	.02253	1.02124	.6959
2000.	6.3319	35830.4	.03343	57.5781	.00047	800.26	327.30	.02678	1.01921	.6948
2200.	5.7829	40208.5	.03225	57.3195	.00043	878.89	344.88	.03141	1.01753	.6835
2400.	5.3207	44988.5	.03098	57.0975	.00040	968.58	366.20	.03653	1.01612	.6783
2600.	4.9253	50395.5	.02953	56.8939	.00037	1077.84	387.06	.04230	1.01492	.6638
2800.	4.5822	56721.9	.02786	56.6907	.00034	1217.60	407.55	.04895	1.01387	.6541
3000.	4.2801	64306.6	.02598	56.4680	.00032	1400.61	427.81	.05673	1.01296	.6343

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

60.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 27.559	.01046	3.8220	1.334	-232.1	395.6	5.911	6.09	7.49	2169.
28.	.01048	3.8074	1.333	-229.8	398.9	6.031	6.13	7.56	2167.
29.	.01052	3.7741	1.329	-224.4	406.5	6.299	6.23	7.73	2164.
30.	.01056	3.7404	1.324	-219.0	414.3	6.564	6.31	7.88	2161.
31.	.01060	3.7063	1.319	-213.4	422.3	6.824	6.40	8.03	2157.
32.	.01064	3.6720	1.313	-207.7	430.4	7.082	6.48	8.18	2153.
33.	.01068	3.6374	1.306	-201.9	438.6	7.336	6.55	8.32	2149.
34.	.01072	3.6026	1.300	-196.0	447.0	7.586	6.63	8.46	2144.
35.	.01076	3.5677	1.293	-190.0	455.6	7.833	6.69	8.59	2140.
36.	.01080	3.5327	1.285	-183.9	464.2	8.077	6.76	8.72	2135.
37.	.01084	3.4976	1.278	-177.6	473.0	8.318	6.82	8.85	2131.
38.	.01089	3.4625	1.270	-171.3	481.9	8.555	6.87	8.97	2126.
39.	.01093	3.4274	1.261	-164.9	490.9	8.790	6.92	9.08	2121.
40.	.01098	3.3924	1.253	-158.4	500.1	9.021	6.96	9.19	2116.
42.	.01107	3.3228	1.236	-145.2	518.7	9.475	7.05	9.41	2106.
44.	.01116	3.2541	1.217	-131.7	537.7	9.918	7.13	9.63	2096.
46.	.01125	3.1864	1.199	-118.4	556.7	10.339	7.25	9.88	2083.
48.	.01135	3.1202	1.180	-104.2	576.7	10.764	7.35	10.10	2071.
50.	.01145	3.0557	1.160	-89.7	597.1	11.181	7.44	10.32	2059.
52.	.01155	2.9932	1.140	-74.8	618.0	11.590	7.52	10.53	2047.
54.	.01165	2.9329	1.119	-59.7	639.2	11.991	7.60	10.73	2035.
56.	.01175	2.8751	1.099	-44.1	661.1	12.390	7.68	10.92	2023.
58.	.01186	2.8199	1.078	-28.4	683.2	12.776	7.74	11.10	2011.
60.	.01197	2.7676	1.057	-12.6	705.5	13.156	7.81	11.27	1999.
65.	.01225	2.6498	1.004	28.1	763.0	14.075	7.99	11.70	1970.
70.	.01254	2.5870	.9585	70.4	823.0	14.964	8.21	12.12	1954.
75.	.01284	2.5083	.9089	114.4	884.8	15.816	8.48	12.56	1927.
80.	.01314	2.4474	.8616	160.2	948.7	16.641	8.80	12.99	1901.
85.	.01345	2.3784	.8168	207.9	1014.7	17.442	9.15	13.46	1871.
90.	.01376	2.3204	.7751	257.6	1083.3	18.225	9.52	13.94	1843.
95.	.01408	2.2690	.7361	309.3	1154.1	18.991	9.92	14.41	1816.
100.	.01440	2.2209	.6994	363.1	1227.3	19.743	10.31	14.88	1790.
110.	.01507	2.1497	.6333	478.3	1382.2	21.217	11.15	15.81	1746.
120.	.01574	2.1021	.5771	599.4	1543.8	22.623	11.81	16.52	1715.
130.	.01643	2.0642	.5298	726.4	1712.0	23.968	12.34	17.11	1692.
140.	.01712	2.0411	.4886	857.6	1885.0	25.250	12.71	17.51	1677.
160.	.01854	2.0338	.4201	1126.7	2238.9	27.613	13.04	17.81	1667.
180.	.01996	2.0523	.3668	1396.4	2593.8	29.704	12.96	17.66	1672.
200.	.02138	2.0865	.3249	1660.7	2943.5	31.545	12.69	17.31	1687.
220.	.02280	2.1322	.2912	1917.2	3285.4	33.175	12.35	16.90	1708.
240.	.02422	2.1830	.2638	2165.9	3619.2	34.627	12.03	16.52	1731.
260.	.02564	2.2398	.2411	2407.7	3946.0	35.936	11.76	16.19	1756.
280.	.02705	2.3043	.2218	2643.8	4266.9	37.125	11.55	15.92	1783.
300.	.02852	2.3746	.2067	2861.0	4572.3	38.156	11.16	15.55	1819.
350.	.03205	2.5564	.1747	3416.2	5339.0	40.519	10.86	15.16	1888.
400.	.03554	2.7441	.1514	3958.3	6090.9	42.529	10.72	14.94	1956.
450.	.03902	2.9351	.1337	4493.1	6834.2	44.281	10.65	14.82	2021.
500.	.04248	3.1280	.1197	5025.0	7573.7	45.838	10.61	14.75	2085.
550.	.04593	3.3222	.1085	5554.1	8309.7	47.241	10.60	14.71	2147.
600.	.04937	3.5175	.0992	6082.5	9044.6	48.519	10.59	14.69	2208.
700.	.05624	3.9107	.0848	7138.7	10512.9	50.784	10.62	14.69	2326.
800.	.06309	4.3066	.0741	8199.3	11984.9	52.748	10.69	14.75	2438.
900.	.06995	4.7046	.0659	9268.6	13465.4	54.490	10.80	14.86	2544.
1000.	.07680	5.1045	.0593	10350.4	14958.2	56.065	10.95	15.01	2645.
1200.	.09050	5.9085	.0494	12567.1	17997.0	58.822	11.32	15.38	2834.
1400.	.10420	6.7169	.0424	14863.9	21116.1	61.230	11.74	15.81	3007.
1600.	.11791	7.5284	.0371	17245.1	24319.9	63.346	12.15	16.22	3171.
1800.	.13163	8.3423	.0330	19710.2	27608.0	65.245	12.52	16.60	3325.
2000.	.14535	9.1580	.0297	22259.2	30980.3	67.087	12.90	16.98	3472.
2200.	.15909	9.9751	.0271	24884.8	34430.2	69.404	13.31	17.41	3612.
2400.	.17286	10.7933	.0248	27601.9	37973.2	71.991	13.81	17.92	3743.
2600.	.18668	11.6124	.0229	30431.5	41632.2	74.759	14.43	18.59	3868.
2800.	.20060	12.4322	.0213	33407.7	45444.0	77.567	15.25	19.48	3985.
3000.	.21471	13.2526	.0199	36577.3	49459.7	80.253	16.31	20.66	4096.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

60.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 27.559	95.5951	2051.5	.22930	365.3665	.00365	217.73	636.02	.00109	1.31803	2.1885
28.	95.4408	2062.7	.22776	363.3861	.00367	218.92	610.44	.00109	1.31747	2.1094
29.	95.0898	2087.0	.22441	358.8802	.00370	221.30	558.99	.00108	1.31620	1.9517
30.	94.7368	2109.1	.22134	354.3538	.00374	223.25	515.14	.00108	1.31492	1.8182
31.	94.3819	2130.6	.21834	349.8125	.00377	223.98	477.48	.00106	1.31363	1.7119
32.	94.0253	2150.9	.21547	345.2615	.00380	224.43	444.87	.00105	1.31233	1.6210
33.	93.6670	2169.6	.21279	340.7062	.00383	224.64	416.47	.00104	1.31104	1.5423
34.	93.3070	2187.2	.21023	336.1516	.00387	224.71	391.56	.00103	1.30973	1.4736
35.	92.9455	2203.8	.20779	331.6027	.00390	224.60	369.60	.00101	1.30842	1.4137
36.	92.5824	2219.3	.20545	327.0642	.00393	224.33	350.12	.00100	1.30711	1.3612
37.	92.2179	2233.8	.20321	322.5406	.00396	223.92	332.77	.00099	1.30579	1.3149
38.	91.8519	2246.8	.20113	318.0367	.00399	223.39	317.25	.00098	1.30447	1.2738
39.	91.4845	2257.8	.19926	313.5566	.00402	222.76	303.29	.00097	1.30314	1.2367
40.	91.1158	2268.0	.19747	309.1046	.00405	222.04	290.69	.00095	1.30181	1.2036
42.	90.3746	2287.4	.19396	300.3011	.00411	220.32	268.91	.00093	1.29914	1.1487
44.	89.6286	2306.6	.19042	291.6575	.00417	218.38	250.78	.00091	1.29645	1.1057
46.	88.8782	2333.1	.18605	283.2026	.00423	216.29	235.52	.00089	1.29375	1.0754
48.	88.1239	2355.3	.18217	274.9634	.00429	214.10	222.53	.00087	1.29105	1.0501
50.	87.3663	2375.9	.17848	266.9642	.00434	211.86	211.35	.00085	1.28833	1.0297
52.	86.6059	2395.3	.17494	259.2269	.00440	209.60	201.66	.00083	1.28560	1.0132
54.	85.8434	2414.1	.17152	251.7707	.00445	207.34	193.17	.00081	1.28288	1.0000
56.	85.0795	2432.1	.16824	244.6121	.00449	205.10	185.69	.00079	1.28015	.9890
58.	84.3151	2448.9	.16515	237.7642	.00453	202.91	179.04	.00078	1.27742	.9796
60.	83.5509	2467.1	.16202	231.2368	.00457	201.04	173.11	.00077	1.27470	.9708
65.	81.6480	2521.4	.15386	216.3540	.00464	197.50	160.71	.00074	1.26794	.9520
70.	79.7274	2609.0	.14637	206.2574	.00465	194.06	150.75	.00072	1.26114	.9418
75.	77.8890	2699.0	.13753	195.3693	.00465	191.18	142.87	.00070	1.25465	.9383
80.	76.0998	2807.6	.12868	186.2454	.00463	188.85	136.37	.00069	1.24835	.9379
85.	74.3631	2914.4	.12007	176.8644	.00462	190.03	130.91	.00068	1.24226	.9272
90.	72.6669	3032.0	.11199	168.6176	.00460	191.23	126.21	.00068	1.23634	.9199
95.	71.0221	3155.6	.10451	161.1474	.00457	192.55	122.16	.00068	1.23060	.9144
100.	69.4259	3280.8	.09769	154.1877	.00454	194.05	118.62	.00068	1.22506	.9097
110.	66.3788	3562.7	.08553	142.6935	.00444	197.28	95.99	.00068	1.21452	.7693
120.	63.5332	3824.0	.07689	133.5510	.00432	198.50	95.18	.00068	1.20473	.7923
130.	60.8789	4057.2	.07055	125.6663	.00422	204.62	94.77	.00071	1.19565	.7923
140.	58.4025	4272.0	.06583	119.2041	.00410	211.66	94.60	.00075	1.18721	.7826
160.	53.9490	4650.9	.05973	109.7236	.00383	223.19	94.72	.00084	1.17215	.7557
180.	50.1062	4952.2	.05647	102.8327	.00357	229.64	95.32	.00093	1.15925	.7332
200.	46.7707	5200.3	.05475	97.5868	.00333	232.23	96.34	.00103	1.14813	.7182
220.	43.8538	5425.4	.05378	93.5038	.00311	232.79	97.75	.00113	1.13847	.7096
240.	41.2843	5641.9	.05314	90.1241	.00293	232.73	99.48	.00123	1.13001	.7060
260.	39.0033	5867.3	.05258	87.3592	.00276	232.91	101.49	.00133	1.12253	.7056
280.	36.9667	6114.0	.05197	85.1829	.00260	233.75	103.73	.00143	1.11589	.7065
300.	35.0602	6263.9	.05283	83.2541	.00248	235.42	106.14	.00155	1.10969	.7013
350.	31.2041	6920.1	.05153	79.7700	.00219	243.06	112.73	.00185	1.09723	.7029
400.	28.1346	7618.7	.05020	77.2052	.00196	254.48	119.80	.00218	1.08738	.7033
450.	25.6289	8342.0	.04896	75.2225	.00178	268.19	127.13	.00254	1.07938	.7026
500.	23.5414	9069.9	.04793	73.6366	.00163	283.18	134.53	.00294	1.07276	.7007
550.	21.7735	9804.4	.04703	72.3365	.00150	298.84	141.95	.00336	1.06717	.6986
600.	20.2558	10543.3	.04626	71.2505	.00139	314.85	149.34	.00381	1.06238	.6966
700.	17.7820	12041.8	.04494	69.5398	.00122	347.42	163.93	.00479	1.05462	.6933
800.	15.8493	13581.0	.04377	68.2560	.00109	380.51	178.19	.00586	1.04858	.6909
900.	14.2966	15173.2	.04267	67.2599	.00098	414.19	192.11	.00702	1.04375	.6893
1000.	13.0213	16826.3	.04159	66.4668	.00089	448.54	205.70	.00826	1.03979	.6883
1200.	11.0499	20314.4	.03953	65.2883	.00076	511.13	231.97	.01083	1.03369	.6980
1400.	9.5966	24034.7	.03763	64.4590	.00066	583.31	257.17	.01384	1.02922	.6970
1600.	8.4807	27895.1	.03604	63.8466	.00058	655.31	281.42	.01715	1.02579	.6966
1800.	7.5971	31856.4	.03472	63.3771	.00052	726.81	304.83	.02075	1.02308	.6962
2000.	6.8798	35983.1	.03351	63.0054	.00047	800.08	327.42	.02465	1.02088	.6951
2200.	6.2858	40352.9	.03233	62.7012	.00043	878.34	344.88	.02889	1.01907	.6836
2400.	5.7852	45111.9	.03106	62.4414	.00040	967.17	366.20	.03358	1.01754	.6787
2600.	5.3568	50475.7	.02964	62.2057	.00037	1074.71	387.06	.03885	1.01623	.6696
2800.	4.9849	56724.4	.02800	61.9738	.00034	1211.44	407.54	.04491	1.01510	.6554
3000.	4.6575	64183.0	.02615	61.7244	.00032	1389.57	427.78	.05198	1.01410	.6362

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

65.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 28.449	.01036	4.0022	1.362	-224.0	449.1	5.964	6.16	7.57	2218.
29.	.01038	3.9846	1.359	-221.1	453.3	6.110	6.21	7.66	2217.
30.	.01041	3.9524	1.355	-215.8	461.0	6.372	6.30	7.81	2213.
31.	.01045	3.9197	1.349	-210.4	468.9	6.631	6.39	7.96	2210.
32.	.01049	3.8867	1.343	-204.8	476.9	6.886	6.47	8.10	2206.
33.	.01053	3.8534	1.337	-199.1	485.1	7.137	6.55	8.24	2203.
34.	.01056	3.8198	1.330	-193.3	493.4	7.385	6.62	8.38	2199.
35.	.01060	3.7860	1.323	-187.4	501.9	7.630	6.69	8.51	2195.
36.	.01064	3.7520	1.316	-181.4	510.4	7.872	6.75	8.64	2190.
37.	.01068	3.7179	1.309	-175.3	519.1	8.110	6.82	8.76	2186.
38.	.01072	3.6836	1.301	-169.1	528.0	8.345	6.87	8.88	2182.
39.	.01076	3.6494	1.293	-162.8	536.9	8.577	6.92	8.99	2177.
40.	.01081	3.6151	1.284	-156.4	545.9	8.806	6.97	9.10	2173.
42.	.01089	3.5468	1.267	-143.5	564.3	9.255	7.06	9.31	2163.
44.	.01098	3.4788	1.249	-130.2	583.2	9.693	7.14	9.52	2153.
46.	.01106	3.4117	1.231	-117.2	601.9	10.110	7.26	9.76	2142.
48.	.01115	3.3456	1.212	-103.2	621.7	10.530	7.36	9.99	2130.
50.	.01124	3.2809	1.193	-88.9	641.9	10.942	7.46	10.20	2118.
52.	.01134	3.2177	1.174	-74.4	662.5	11.346	7.55	10.41	2106.
54.	.01143	3.1564	1.154	-59.5	683.5	11.743	7.63	10.61	2095.
56.	.01153	3.0971	1.134	-44.1	705.2	12.137	7.71	10.79	2083.
58.	.01162	3.0401	1.113	-28.7	726.9	12.519	7.78	10.97	2071.
60.	.01172	2.9855	1.093	-13.1	749.0	12.894	7.85	11.15	2059.
65.	.01198	2.8605	1.041	27.1	805.8	13.803	8.04	11.58	2029.
70.	.01225	2.7527	.9896	68.8	864.8	14.676	8.27	12.00	1999.
75.	.01253	2.6984	.9479	112.2	926.7	15.530	8.54	12.46	1984.
80.	.01281	2.6250	.9006	157.5	990.1	16.348	8.86	12.91	1956.
85.	.01309	2.5726	.8561	204.8	1055.8	17.145	9.21	13.36	1932.
90.	.01338	2.5105	.8141	254.1	1123.8	17.923	9.59	13.84	1904.
95.	.01367	2.4550	.7749	305.5	1194.2	18.684	9.98	14.33	1877.
100.	.01397	2.4087	.7382	359.0	1267.1	19.431	10.38	14.79	1853.
110.	.01458	2.3293	.6709	473.8	1421.2	20.898	11.22	15.74	1807.
120.	.01519	2.2696	.6121	594.6	1582.1	22.298	11.89	16.46	1773.
130.	.01582	2.2233	.5625	721.2	1749.5	23.637	12.41	17.04	1747.
140.	.01646	2.1952	.5204	852.2	1921.9	24.915	12.78	17.45	1732.
160.	.01775	2.1754	.4500	1121.1	2275.1	27.273	13.10	17.79	1719.
180.	.01906	2.1875	.3937	1391.0	2630.1	29.364	13.02	17.66	1722.
200.	.02037	2.2138	.3493	1655.7	2979.6	31.204	12.75	17.32	1734.
220.	.02168	2.2546	.3134	1912.7	3321.6	32.834	12.40	16.91	1753.
240.	.02298	2.3018	.2841	2161.8	3655.6	34.288	12.08	16.52	1774.
260.	.02428	2.3531	.2597	2404.1	3982.5	35.596	11.81	16.20	1797.
280.	.02558	2.4115	.2392	2640.8	4303.7	36.787	11.60	15.94	1821.
300.	.02694	2.4814	.2234	2857.8	4608.9	37.816	11.20	15.57	1858.
350.	.03019	2.6583	.1888	3414.1	5376.6	40.182	10.89	15.17	1924.
400.	.03342	2.8423	.1636	3957.2	6129.3	42.194	10.75	14.95	1989.
450.	.03662	3.0302	.1445	4492.9	6873.4	43.948	10.68	14.84	2052.
500.	.03981	3.2205	.1294	5025.5	7613.4	45.506	10.64	14.76	2114.
550.	.04300	3.4125	.1173	5555.3	8350.0	46.911	10.62	14.72	2175.
600.	.04617	3.6058	.1073	6084.2	9085.2	48.189	10.61	14.69	2234.
700.	.05250	3.9954	.0917	7141.4	10554.0	50.454	10.63	14.70	2350.
800.	.05883	4.3882	.0801	8202.6	12026.2	52.419	10.70	14.76	2460.
900.	.06514	4.7836	.0712	9272.4	13506.8	54.161	10.81	14.86	2564.
1000.	.07146	5.1811	.0641	10354.7	14999.6	55.737	10.96	15.01	2664.
1200.	.08410	5.9812	.0534	12572.0	18038.3	58.493	11.33	15.38	2850.
1400.	.09674	6.7864	.0458	14869.3	21157.3	60.901	11.75	15.81	3022.
1600.	.10939	7.5953	.0402	17250.8	24360.9	63.017	12.16	16.22	3183.
1800.	.12204	8.4071	.0357	19716.2	27648.8	64.916	12.53	16.60	3337.
2000.	.13470	9.2210	.0322	22265.1	31020.6	66.758	12.91	16.98	3486.
2200.	.14737	10.0365	.0293	24890.3	34469.6	69.074	13.31	17.40	3622.
2400.	.16008	10.8534	.0268	27605.6	38010.5	71.660	13.80	17.91	3753.
2600.	.17283	11.6713	.0248	30431.5	41665.3	74.426	14.41	18.56	3877.
2800.	.18567	12.4901	.0230	33400.2	45469.0	77.232	15.21	19.43	3994.
3000.	.19867	13.3096	.0215	36556.7	49470.5	79.913	16.24	20.57	4106.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

65.00 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	28.449	96.5666	2149.1	.22897	386.4808	.00352	226.54	671.06	.00112	1.32157	2.2429
	29.	96.3788	2163.7	.22708	384.0341	.00354	227.87	637.85	.00111	1.32089	2.1438
	30.	96.0369	2188.5	.22388	379.5738	.00357	229.95	584.75	.00110	1.31964	1.9860
	31.	95.6934	2212.6	.22076	375.0909	.00360	230.77	539.38	.00109	1.31839	1.8602
	32.	95.3485	2235.6	.21778	370.5907	.00362	231.29	500.29	.00108	1.31714	1.7529
	33.	95.0022	2256.7	.21500	366.0785	.00365	231.55	466.38	.00106	1.31588	1.6602
	34.	94.6545	2276.7	.21235	361.5592	.00368	231.67	436.78	.00105	1.31462	1.5795
	35.	94.3056	2295.6	.20982	357.0376	.00371	231.60	410.78	.00104	1.31335	1.5092
	36.	93.9554	2313.4	.20740	352.5185	.00373	231.36	387.81	.00103	1.31208	1.4477
	37.	93.6040	2330.0	.20509	348.0064	.00376	230.98	367.42	.00101	1.31081	1.3936
	38.	93.2515	2345.1	.20294	343.5058	.00379	230.47	349.23	.00100	1.30953	1.3455
	39.	92.8979	2358.1	.20101	339.0208	.00381	229.85	332.94	.00099	1.30825	1.3023
	40.	92.5432	2370.1	.19918	334.5557	.00384	229.15	318.27	.00098	1.30697	1.2637
	42.	91.8306	2393.1	.19557	325.7010	.00389	227.43	293.03	.00096	1.30439	1.1995
	44.	91.1142	2415.6	.19196	316.9722	.00394	225.49	272.14	.00094	1.30180	1.1491
	46.	90.3942	2445.9	.18751	308.3978	.00399	223.39	254.64	.00091	1.29921	1.1130
	48.	89.6710	2471.3	.18358	300.0041	.00404	221.18	239.82	.00089	1.29660	1.0828
	50.	88.9450	2494.9	.17985	291.8155	.00409	218.91	227.13	.00087	1.29399	1.0583
	52.	88.2165	2517.0	.17629	283.8540	.00413	216.62	216.17	.00085	1.29138	1.0385
	54.	87.4862	2538.2	.17285	276.1393	.00418	214.32	206.62	.00083	1.28876	1.0224
	56.	86.7546	2558.4	.16955	268.6887	.00422	212.04	198.24	.00082	1.28614	1.0092
	58.	86.0223	2577.0	.16646	261.5165	.00426	209.80	190.83	.00080	1.28352	.9979
	60.	85.2899	2596.8	.16333	254.6345	.00429	207.89	184.23	.00079	1.28090	.9877
	65.	83.4637	2654.4	.15517	238.7487	.00436	204.26	170.54	.00076	1.27439	.9665
	70.	81.6539	2726.7	.14655	224.7719	.00440	200.86	159.83	.00074	1.26796	.9552
	75.	79.8094	2831.2	.13906	215.3549	.00440	197.60	150.94	.00072	1.26143	.9519
	80.	78.0755	2938.8	.13021	204.9503	.00439	195.13	143.92	.00070	1.25531	.9525
	85.	76.3829	3067.0	.12167	196.5034	.00436	196.26	138.02	.00069	1.24935	.9397
	90.	74.7374	3190.4	.11359	187.6264	.00434	197.42	133.01	.00069	1.24358	.9326
	95.	73.1402	3319.5	.10614	179.5626	.00432	198.71	128.69	.00068	1.23799	.9278
	100.	71.5815	3455.3	.09936	172.4154	.00428	200.15	124.90	.00068	1.23255	.9232
	110.	68.6093	3749.3	.08712	159.8138	.00420	201.99	98.28	.00067	1.22223	.7658
	120.	65.8245	4017.1	.07823	149.3972	.00410	203.00	97.63	.00067	1.21261	.7916
	130.	63.2125	4256.2	.07173	140.5410	.00400	209.55	97.35	.00070	1.20363	.7914
	140.	60.7642	4473.6	.06704	133.3902	.00390	217.33	97.29	.00074	1.19525	.7813
	160.	56.3265	4845.1	.06099	122.5338	.00367	230.50	97.50	.00083	1.18017	.7525
	180.	52.4598	5146.9	.05763	114.7553	.00343	238.23	98.08	.00093	1.16714	.7270
	200.	49.0968	5388.9	.05582	108.6924	.00321	241.47	99.01	.00102	1.15588	.7101
	220.	46.1349	5610.8	.05477	104.0147	.00301	242.09	100.28	.00112	1.14602	.7003
	240.	43.5148	5825.6	.05405	100.1616	.00284	241.68	101.86	.00121	1.13736	.6964
	260.	41.1807	6045.4	.05341	96.9032	.00268	241.26	103.72	.00130	1.12967	.6966
	280.	39.0881	6282.9	.05277	94.2613	.00254	241.39	105.79	.00139	1.12281	.6988
	300.	37.1199	6422.2	.05375	92.1109	.00243	242.32	108.06	.00151	1.11639	.6946
	350.	33.1220	7075.3	.05233	88.0478	.00214	248.28	114.33	.00178	1.10341	.6988
	400.	29.9249	7772.7	.05089	85.0545	.00192	258.41	121.15	.00208	1.09312	.7011
	450.	27.3054	8495.7	.04956	82.7398	.00175	271.20	128.27	.00241	1.08473	.7017
	500.	25.1167	9223.4	.04845	80.8880	.00160	285.52	135.52	.00277	1.07776	.7005
	550.	23.2585	9957.7	.04750	79.3692	.00148	300.70	142.82	.00316	1.07186	.6989
	600.	21.6597	10696.6	.04668	78.1000	.00137	316.36	150.11	.00358	1.06681	.6971
	700.	19.0469	12194.6	.04528	76.0993	.00121	348.47	164.54	.00448	1.05858	.6939
	800.	16.9995	13733.4	.04405	74.5967	.00107	381.28	178.69	.00547	1.05217	.6915
	900.	15.3506	15325.3	.04290	73.4304	.00097	414.78	192.52	.00654	1.04703	.6899
	1000.	13.9936	16978.4	.04179	72.5016	.00088	449.01	206.05	.00770	1.04281	.6888
	1200.	11.8910	20466.9	.03968	71.1217	.00075	511.13	232.23	.01006	1.03629	.6988
	1400.	10.3371	24188.1	.03775	70.1517	.00065	583.31	257.38	.01285	1.03150	.6975
	1600.	9.1420	28049.4	.03613	69.4362	.00058	655.31	281.60	.01591	1.02782	.6970
	1800.	8.1941	32010.6	.03479	68.8884	.00052	726.77	304.97	.01924	1.02491	.6965
	2000.	7.4239	36135.2	.03358	68.4555	.00047	799.93	327.54	.02284	1.02255	.6953
	2200.	6.7854	40497.5	.03239	68.1022	.00043	877.86	344.88	.02676	1.02060	.6837
	2400.	6.2471	45237.9	.03114	67.8020	.00040	965.93	366.20	.03108	1.01895	.6790
	2600.	5.7861	50563.6	.02973	67.5319	.00037	1071.95	387.05	.03593	1.01754	.6702
	2800.	5.3858	56743.8	.02812	67.2696	.00034	1206.00	407.53	.04149	1.01632	.6565
	3000.	5.0333	64091.2	.02631	66.9921	.00032	1379.81	427.75	.04797	1.01525	.6378

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

70.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 29.318	.01026	4.1801	1.389	-215.9	502.1	6.014	6.22	7.65	2266.
30.	.01028	4.1590	1.385	-212.3	507.3	6.191	6.29	7.75	2264.
31.	.01032	4.1278	1.380	-207.0	515.1	6.448	6.38	7.90	2261.
32.	.01035	4.0961	1.374	-201.5	523.1	6.701	6.46	8.04	2258.
33.	.01039	4.0640	1.368	-195.9	531.2	6.950	6.54	8.18	2254.
34.	.01042	4.0316	1.361	-190.2	539.5	7.197	6.61	8.31	2251.
35.	.01046	3.9989	1.354	-184.5	547.8	7.439	6.68	8.44	2247.
36.	.01050	3.9660	1.346	-178.6	556.3	7.679	6.75	8.56	2243.
37.	.01054	3.9329	1.339	-172.6	565.0	7.915	6.81	8.69	2239.
38.	.01057	3.8996	1.331	-166.5	573.7	8.148	6.87	8.80	2235.
39.	.01061	3.8663	1.323	-160.3	582.6	8.378	6.92	8.91	2231.
40.	.01065	3.8328	1.315	-154.0	591.5	8.605	6.97	9.02	2227.
42.	.01073	3.7658	1.298	-141.3	609.8	9.050	7.06	9.22	2218.
44.	.01081	3.6990	1.280	-128.3	628.4	9.484	7.15	9.43	2208.
46.	.01089	3.6326	1.262	-115.4	647.0	9.896	7.27	9.67	2197.
48.	.01097	3.5669	1.244	-101.7	666.5	10.312	7.38	9.89	2186.
50.	.01106	3.5023	1.225	-87.6	686.5	10.720	7.48	10.10	2175.
52.	.01115	3.4389	1.206	-73.3	706.9	11.120	7.57	10.30	2163.
54.	.01123	3.3770	1.186	-58.6	727.7	11.513	7.65	10.49	2152.
56.	.01132	3.3169	1.167	-43.5	749.2	11.903	7.73	10.68	2140.
58.	.01141	3.2586	1.147	-28.3	770.7	12.281	7.81	10.86	2129.
60.	.01151	3.2024	1.127	-12.9	792.6	12.651	7.88	11.03	2117.
65.	.01174	3.0721	1.076	26.7	848.8	13.552	8.08	11.46	2087.
70.	.01199	2.9572	1.026	68.0	907.2	14.417	8.32	11.90	2056.
75.	.01224	2.8583	.9754	110.9	967.8	15.253	8.60	12.34	2025.
80.	.01251	2.8104	.9375	155.8	1031.7	16.077	8.92	12.83	2011.
85.	.01278	2.7389	.8922	202.7	1097.0	16.869	9.27	13.31	1982.
90.	.01304	2.6879	.8500	251.6	1164.7	17.643	9.65	13.77	1958.
95.	.01331	2.6388	.8108	302.7	1234.7	18.400	10.05	14.24	1934.
100.	.01359	2.5856	.7738	355.9	1307.2	19.143	10.44	14.72	1909.
110.	.01415	2.5054	.7068	470.2	1460.6	20.604	11.29	15.68	1865.
120.	.01472	2.4419	.6464	590.8	1621.0	21.999	11.96	16.41	1830.
130.	.01529	2.3895	.5936	717.2	1787.8	23.334	12.48	16.96	1802.
140.	.01588	2.3428	.5496	847.9	1959.5	24.606	12.84	17.40	1781.
160.	.01708	2.3086	.4780	1116.6	2312.0	26.959	13.16	17.78	1766.
180.	.01829	2.3219	.4199	1386.6	2666.8	29.049	13.38	17.65	1770.
200.	.01950	2.3430	.3730	1651.6	3016.3	30.890	12.80	17.32	1780.
220.	.02071	2.3767	.3350	1909.0	3358.4	32.520	12.46	16.91	1796.
240.	.02191	2.4198	.3039	2158.6	3692.5	33.974	12.13	16.53	1816.
260.	.02312	2.4681	.2779	2401.3	4019.6	35.284	11.86	16.21	1837.
280.	.02432	2.5196	.2561	2638.4	4340.9	36.474	11.65	15.96	1858.
300.	.02558	2.5891	.2399	2855.1	4645.7	37.502	11.23	15.59	1896.
350.	.02860	2.7603	.2029	3412.5	5414.3	39.871	10.93	15.19	1959.
400.	.03159	2.9409	.1758	3956.4	6167.8	41.885	10.77	14.97	2021.
450.	.03457	3.1257	.1552	4493.0	6912.7	43.640	10.70	14.85	2082.
500.	.03753	3.3133	.1391	5026.3	7653.2	45.200	10.66	14.77	2143.
550.	.04048	3.5030	.1260	5556.7	8390.2	46.605	10.64	14.72	2202.
600.	.04342	3.6941	.1153	6086.3	9125.8	47.883	10.63	14.70	2260.
700.	.04930	4.0800	.0985	7144.3	10595.1	50.150	10.65	14.70	2373.
800.	.05516	4.4695	.0861	8206.2	12067.6	52.114	10.72	14.76	2481.
900.	.06102	4.8621	.0765	9276.6	13548.2	53.857	10.83	14.86	2583.
1000.	.06688	5.2571	.0689	10359.3	15041.1	55.432	10.97	15.01	2681.
1200.	.07860	6.0529	.0574	12577.3	18079.7	58.189	11.34	15.38	2865.
1400.	.09033	6.8547	.0493	14875.1	21198.4	60.597	11.76	15.81	3035.
1600.	.10207	7.6609	.0432	17257.0	24401.8	62.713	12.16	16.22	3196.
1800.	.11381	8.4703	.0384	19722.6	27689.3	64.611	12.54	16.60	3349.
2000.	.12556	9.2822	.0346	22271.6	31060.8	66.453	12.91	16.98	3494.
2200.	.13732	10.0961	.0315	24896.3	34508.9	68.768	13.32	17.40	3632.
2400.	.14911	10.9115	.0289	27610.2	38047.9	71.354	13.79	17.90	3763.
2600.	.16094	11.7282	.0267	30432.7	41698.8	74.119	14.39	18.54	3886.
2800.	.17286	12.5459	.0248	33394.8	45495.3	76.921	15.17	19.38	4003.
3000.	.18492	13.3644	.0231	36539.5	49484.2	79.598	16.17	20.49	4114.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

70.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DV)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 29.318	97.4967	2244.6	.22878	407.5451	.00341	235.03	706.81	.00113	1.32496	2.2999
30.	97.2698	2263.3	.22652	404.5479	.00342	236.48	664.21	.00113	1.32413	2.1766
31.	96.9362	2290.1	.22326	400.1290	.00345	237.38	603.63	.00112	1.32292	2.0281
32.	96.6013	2315.6	.22016	395.6857	.00347	237.96	562.84	.00110	1.32170	1.9017
33.	96.2654	2339.2	.21728	391.2231	.00350	238.28	522.44	.00109	1.32047	1.7928
34.	95.9283	2361.7	.21452	386.7464	.00352	238.44	487.31	.00108	1.31925	1.6983
35.	95.5903	2382.9	.21190	382.2602	.00354	238.41	456.58	.00106	1.31802	1.6162
36.	95.2513	2402.9	.20940	377.7693	.00356	238.20	429.54	.00105	1.31678	1.5445
37.	94.9113	2421.8	.20701	373.2781	.00359	237.84	405.62	.00104	1.31555	1.4814
38.	94.5704	2439.0	.20480	368.7910	.00361	237.35	384.35	.00103	1.31431	1.4255
39.	94.2287	2454.0	.20280	364.3122	.00363	236.74	365.36	.00101	1.31307	1.3753
40.	93.8860	2467.9	.20091	359.8459	.00365	236.04	348.32	.00100	1.31183	1.3306
42.	93.1984	2494.5	.19720	350.9664	.00370	234.33	319.11	.00098	1.30934	1.2561
44.	92.5077	2520.5	.19350	342.1825	.00374	232.37	295.08	.00096	1.30684	1.1974
46.	91.8141	2554.6	.18898	333.5225	.00378	230.25	275.04	.00093	1.30433	1.1548
48.	91.1180	2583.4	.18498	325.0125	.00383	228.02	258.15	.00091	1.30182	1.1192
50.	90.4196	2610.1	.18120	316.6769	.00387	225.72	243.76	.00089	1.29930	1.0902
52.	89.7192	2635.1	.17760	308.5377	.00391	223.38	231.37	.00087	1.29678	1.0666
54.	89.0173	2659.1	.17413	300.6150	.00395	221.04	220.63	.00085	1.29425	1.0474
56.	88.3142	2681.6	.17081	292.9268	.00398	218.72	211.24	.00083	1.29173	1.0315
58.	87.6105	2702.3	.16771	285.4884	.00402	216.43	202.97	.00082	1.28920	1.0180
60.	86.9066	2724.0	.16456	278.3130	.00405	214.49	195.64	.00081	1.28668	1.0060
65.	85.1501	2786.0	.15639	261.5869	.00411	210.78	180.52	.00078	1.28040	.9818
70.	83.4061	2862.2	.14776	246.6504	.00416	207.27	168.78	.00075	1.27418	.9692
75.	81.6851	2954.4	.13883	233.4795	.00418	204.10	159.41	.00073	1.26807	.9640
80.	79.9139	3074.7	.13156	224.5879	.00417	201.19	151.41	.00071	1.26180	.9659
85.	78.2693	3197.1	.12292	214.3757	.00416	202.29	145.08	.00070	1.25599	.9544
90.	76.6635	3338.2	.11486	206.0676	.00413	203.40	139.71	.00069	1.25033	.9458
95.	75.1048	3481.5	.10745	198.1874	.00409	204.63	135.10	.00069	1.24486	.9403
100.	73.5871	3619.7	.10068	190.2657	.00407	206.04	131.08	.00068	1.23955	.9365
110.	70.6790	3929.2	.08855	177.0813	.00399	206.34	100.35	.00067	1.22941	.7627
120.	67.9484	4211.3	.07954	165.9205	.00390	207.14	99.88	.00067	1.21994	.7910
130.	65.3832	4464.3	.07276	156.2308	.00380	214.16	99.76	.00070	1.21109	.7902
140.	62.9718	4669.6	.06796	147.5332	.00373	222.71	99.81	.00073	1.20280	.7796
160.	58.5562	5027.6	.06203	135.1813	.00354	237.69	100.16	.00082	1.18773	.7492
180.	54.6784	5338.3	.05869	126.9584	.00331	246.93	100.76	.00092	1.17460	.7204
200.	51.2917	5579.8	.05679	120.1748	.00310	251.06	101.63	.00102	1.16322	.7010
220.	48.2948	5794.6	.05568	114.7806	.00292	251.94	102.80	.00111	1.15320	.6902
240.	45.6339	6007.1	.05488	110.4232	.00275	251.29	104.25	.00120	1.14436	.6858
260.	43.2550	6226.3	.05418	106.7565	.00260	250.33	105.95	.00129	1.13650	.6861
280.	41.1164	6455.3	.05348	103.5957	.00247	249.76	107.89	.00137	1.12946	.6892
300.	39.0924	6579.6	.05464	101.2148	.00237	249.94	110.02	.00148	1.12283	.6864
350.	34.9676	7230.0	.05310	96.5405	.00210	254.11	115.98	.00172	1.10939	.6934
400.	31.6542	7926.3	.05155	93.0932	.00189	262.82	122.55	.00200	1.09868	.6980
450.	28.9300	8649.0	.05014	90.4261	.00172	274.57	129.46	.00230	1.08993	.7001
500.	26.6473	9376.7	.04896	88.2911	.00158	288.14	136.55	.00264	1.08263	.6999
550.	24.7046	10111.0	.04795	86.5392	.00146	302.78	143.72	.00300	1.07645	.6988
600.	23.0296	10849.8	.04708	85.0743	.00135	318.05	150.90	.00338	1.07114	.6974
700.	20.2852	12347.5	.04560	82.7633	.00119	349.62	165.17	.00422	1.06247	.6944
800.	18.1285	13886.0	.04431	81.0261	.00106	382.12	179.20	.00514	1.05570	.6921
900.	16.3874	15477.6	.04312	79.6768	.00096	415.42	192.96	.00614	1.05026	.6904
1000.	14.9516	17130.6	.04197	78.6020	.00088	449.52	206.42	.00721	1.04578	.6892
1200.	12.7219	20619.3	.03982	77.0053	.00075	511.13	232.51	.00941	1.03886	.6996
1400.	11.0702	24341.3	.03785	75.8835	.00065	583.31	257.60	.01200	1.03376	.6980
1600.	9.7974	28203.1	.03621	75.0570	.00058	655.30	281.78	.01485	1.02983	.6974
1800.	8.7866	32164.1	.03486	74.4252	.00052	726.74	305.12	.01794	1.02673	.6968
2000.	7.9643	36286.7	.03364	73.9267	.00047	799.79	327.67	.02129	1.02420	.6956
2200.	7.2821	40642.1	.03245	73.5209	.00043	877.43	344.88	.02493	1.02211	.6838
2400.	6.7064	45365.9	.03120	73.1775	.00039	964.82	366.20	.02834	1.02035	.6793
2600.	6.2133	50657.5	.02981	72.8709	.00037	1069.50	387.05	.03343	1.01885	.6708
2800.	5.7849	56776.7	.02823	72.5766	.00034	1201.16	407.52	.03857	1.01754	.6575
3000.	5.4076	64025.0	.02645	72.2696	.00032	1371.13	427.73	.04454	1.01639	.6393

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

80.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 30.999	.01008	4.5298	1.441	-199.5	606.6	6.109	6.35	7.80	2358.
31.	.01008	4.5298	1.441	-199.5	606.6	6.109	6.35	7.80	2358.
32.	.01011	4.5007	1.435	-194.2	614.4	6.359	6.44	7.94	2355.
33.	.01014	4.4712	1.428	-188.8	622.5	6.605	6.52	8.07	2352.
34.	.01017	4.4412	1.421	-183.3	630.6	6.848	6.60	8.20	2349.
35.	.01021	4.4109	1.414	-177.7	638.9	7.088	6.67	8.33	2346.
36.	.01024	4.3802	1.406	-172.0	647.2	7.324	6.74	8.45	2343.
37.	.01027	4.3491	1.399	-166.2	655.8	7.557	6.81	8.57	2339.
38.	.01031	4.3178	1.391	-160.3	664.4	7.787	6.87	8.68	2335.
39.	.01034	4.2863	1.382	-154.3	673.1	8.014	6.92	8.78	2332.
40.	.01038	4.2545	1.374	-148.3	681.9	8.238	6.97	8.89	2328.
42.	.01045	4.1906	1.357	-135.9	699.9	8.676	7.07	9.08	2320.
44.	.01052	4.1263	1.339	-123.2	718.3	9.103	7.17	9.28	2312.
46.	.01059	4.0620	1.322	-110.8	736.5	9.509	7.29	9.51	2302.
48.	.01067	3.9979	1.303	-97.4	755.8	9.918	7.40	9.72	2291.
50.	.01074	3.9342	1.285	-83.8	775.4	10.319	7.51	9.93	2281.
52.	.01082	3.8712	1.266	-69.8	795.5	10.712	7.60	10.12	2270.
54.	.01089	3.8092	1.247	-55.5	815.9	11.098	7.69	10.31	2259.
56.	.01097	3.7484	1.228	-40.7	837.0	11.481	7.78	10.49	2248.
58.	.01105	3.6888	1.209	-25.9	858.1	11.852	7.86	10.66	2238.
60.	.01113	3.6308	1.190	-10.9	879.6	12.217	7.94	10.84	2226.
65.	.01134	3.4936	1.141	27.9	934.9	13.101	8.16	11.27	2197.
70.	.01155	3.3690	1.092	68.3	992.4	13.953	8.41	11.72	2167.
75.	.01177	3.2580	1.043	110.5	1052.1	14.777	8.71	12.18	2135.
80.	.01199	3.1609	.9949	154.6	1114.2	15.578	9.04	12.64	2103.
85.	.01222	3.0766	.9473	200.7	1178.6	16.359	9.40	13.11	2071.
90.	.01247	3.0327	.9169	249.0	1246.9	17.140	9.78	13.66	2058.
95.	.01271	2.9769	.8751	299.6	1316.3	17.890	10.18	14.13	2033.
100.	.01295	2.9212	.8370	352.3	1388.2	18.628	10.58	14.60	2008.
110.	.01343	2.8310	.7691	465.7	1540.5	20.077	11.43	15.57	1964.
120.	.01393	2.7645	.7095	585.7	1699.9	21.465	12.10	16.33	1932.
130.	.01443	2.7214	.6549	711.8	1866.2	22.795	12.62	16.89	1908.
140.	.01493	2.6714	.6055	842.3	2036.9	24.060	12.99	17.27	1885.
160.	.01596	2.5674	.5274	1110.3	2387.0	26.397	13.29	17.71	1849.
180.	.01701	2.5527	.4682	1380.1	2741.1	28.483	13.20	17.68	1849.
200.	.01807	2.5993	.4183	1645.6	3091.1	30.326	12.92	17.32	1866.
220.	.01912	2.6204	.3764	1903.7	3433.3	31.957	12.57	16.92	1878.
240.	.02017	2.6518	.3419	2154.1	3767.6	33.412	12.24	16.55	1893.
260.	.02122	2.6955	.3131	2397.7	4095.1	34.723	11.97	16.22	1912.
280.	.02226	2.7419	.2886	2635.8	4416.7	35.915	11.75	15.97	1930.
300.	.02336	2.8067	.2723	2851.0	4720.1	36.935	11.30	15.62	1970.
350.	.02600	2.9678	.2305	3410.2	5490.3	39.309	10.99	15.22	2028.
400.	.02862	3.1398	.1999	3956.0	6245.3	41.327	10.83	15.00	2085.
450.	.03122	3.3179	.1765	4494.1	6991.4	43.086	10.75	14.87	2142.
500.	.03380	3.4998	.1581	5028.9	7733.0	44.648	10.71	14.79	2199.
550.	.03638	3.6845	.1433	5560.5	8470.9	46.054	10.68	14.74	2255.
600.	.03895	3.8711	.1310	6091.1	9207.2	47.334	10.67	14.71	2310.
700.	.04408	4.2490	.1120	7151.0	10677.3	49.602	10.69	14.71	2418.
800.	.04920	4.6316	.0979	8214.4	12150.2	51.567	10.75	14.76	2521.
900.	.05431	5.0180	.0870	9286.0	13631.0	53.310	10.86	14.86	2621.
1000.	.05943	5.4076	.0783	10369.6	15123.9	54.885	11.00	15.01	2716.
1200.	.06966	6.1941	.0653	12589.1	18162.1	57.642	11.36	15.38	2895.
1400.	.07990	6.9883	.0561	14888.0	21280.4	60.049	11.78	15.80	3062.
1600.	.09016	7.7882	.0491	17270.7	24483.1	62.164	12.18	16.21	3219.
1800.	.10041	8.5924	.0437	19736.8	27770.0	64.062	12.55	16.59	3370.
2000.	.11068	9.3998	.0394	22286.0	31140.6	65.904	12.92	16.97	3513.
2200.	.12096	10.2099	.0359	24910.0	34587.1	68.218	13.32	17.39	3650.
2400.	.13127	11.0220	.0329	27621.5	38122.8	70.803	13.79	17.87	3780.
2600.	.14161	11.8358	.0304	30438.3	41767.0	73.565	14.37	18.49	3903.
2800.	.15202	12.6509	.0282	33389.1	45550.9	76.363	15.11	19.30	4019.
3000.	.16255	13.4672	.0264	36513.9	49518.2	79.032	16.06	20.36	4130.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

80.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 30.999	99.2474	2432.3	.22852	449.5687	.00321	250.16	780.58	.00116	1.33135	2.4329
31.	99.2472	2432.4	.22852	449.5664	.00321	250.16	780.54	.00116	1.33135	2.4328
32.	98.9287	2463.0	.22516	445.2508	.00322	250.86	713.79	.00115	1.33019	2.2585
33.	98.6096	2491.7	.22204	440.9031	.00324	251.28	656.67	.00114	1.32902	2.1094
34.	98.2898	2518.9	.21907	436.5283	.00326	251.52	607.43	.00112	1.32785	1.9807
35.	97.9695	2544.9	.21625	432.1310	.00327	251.55	564.71	.00111	1.32668	1.8694
36.	97.6487	2569.5	.21356	427.7161	.00329	251.39	527.40	.00110	1.32551	1.7726
37.	97.3273	2592.9	.21101	423.2880	.00330	251.06	494.63	.00108	1.32434	1.6879
38.	97.0055	2614.3	.20863	418.8511	.00332	250.59	465.69	.00107	1.32317	1.6131
39.	96.6832	2633.3	.20650	414.4095	.00334	250.00	440.01	.00106	1.32199	1.5462
40.	96.3604	2651.1	.20447	409.9674	.00335	249.31	417.12	.00105	1.32082	1.4868
42.	95.7136	2685.2	.20053	401.0970	.00338	247.57	378.19	.00102	1.31846	1.3878
44.	95.0651	2718.5	.19662	392.2698	.00341	245.58	346.50	.00100	1.31611	1.3098
46.	94.4152	2760.4	.19192	383.5138	.00345	243.40	320.34	.00098	1.31375	1.2519
48.	93.7638	2796.3	.18777	374.8552	.00348	241.09	298.49	.00095	1.31139	1.2037
50.	93.1112	2829.6	.18387	366.3183	.00351	238.71	280.02	.00093	1.30902	1.1643
52.	92.4575	2860.9	.18017	357.9256	.00354	236.29	264.26	.00091	1.30666	1.1319
54.	91.8029	2890.6	.17661	349.6978	.00357	233.86	250.70	.00089	1.30429	1.1053
56.	91.1477	2918.5	.17323	341.6538	.00360	231.44	238.92	.00087	1.30193	1.0832
58.	90.4922	2944.0	.17007	333.8105	.00362	229.05	228.63	.00085	1.29956	1.0645
60.	89.8367	2970.3	.16689	326.1830	.00365	227.02	219.57	.00084	1.29720	1.0480
65.	88.2001	3043.0	.15866	308.1377	.00370	223.14	201.10	.00081	1.29132	1.0158
70.	86.5721	3129.1	.15001	291.6594	.00375	219.43	186.99	.00078	1.28548	.9987
75.	84.9602	3231.1	.14104	276.8026	.00377	216.05	175.89	.00075	1.27972	.9916
80.	83.3722	3349.3	.13200	263.5304	.00378	213.19	166.95	.00073	1.27406	.9902
85.	81.8151	3482.3	.12316	251.7159	.00376	214.22	159.60	.00072	1.26853	.9764
90.	80.1666	3622.4	.11696	243.1203	.00377	214.82	152.93	.00071	1.26269	.9725
95.	78.6848	3781.3	.10926	234.2384	.00374	215.98	147.72	.00070	1.25745	.9663
100.	77.2243	3935.0	.10246	225.5857	.00371	217.27	143.17	.00069	1.25231	.9621
110.	74.4329	4267.4	.09042	210.7199	.00365	214.08	103.96	.00066	1.24251	.7563
120.	71.7961	4569.5	.08170	198.4820	.00357	214.53	103.86	.00066	1.23330	.7908
130.	69.3007	4862.9	.07488	188.5974	.00347	222.50	104.08	.00068	1.22462	.7899
140.	66.9708	5104.0	.06960	178.9029	.00338	232.68	104.41	.00072	1.21656	.7752
160.	62.6633	5401.5	.06332	160.8803	.00328	251.68	105.14	.00082	1.20175	.7398
180.	58.7805	5665.4	.06032	150.0471	.00312	264.61	105.89	.00092	1.18850	.7074
200.	55.3429	5954.7	.05851	143.8526	.00291	271.23	106.73	.00102	1.17685	.6814
220.	52.3020	6161.1	.05724	137.0497	.00275	273.24	107.75	.00111	1.16661	.6674
240.	49.5830	6363.3	.05632	131.4833	.00260	272.56	108.99	.00120	1.15750	.6618
260.	47.1312	6583.5	.05550	127.0411	.00246	270.77	110.46	.00127	1.14933	.6619
280.	44.9199	6813.4	.05468	123.1659	.00234	268.88	112.14	.00135	1.14200	.6658
300.	42.8013	6891.6	.05633	120.1304	.00227	267.51	114.01	.00144	1.13500	.6659
350.	38.4605	7537.1	.05457	114.1447	.00202	267.76	119.38	.00165	1.12076	.6787
400.	34.9447	8231.9	.05283	109.7182	.00182	273.23	125.45	.00188	1.10932	.6886
450.	32.0350	8954.7	.05124	106.2877	.00166	282.54	131.96	.00213	1.09991	.6946
500.	29.5836	9682.6	.04993	103.5380	.00153	294.34	138.72	.00242	1.09202	.6970
550.	27.4879	10417.3	.04880	101.2786	.00141	307.68	145.62	.00273	1.08531	.6975
600.	25.6738	11156.2	.04783	99.3867	.00132	321.99	152.58	.00307	1.07953	.6970
700.	22.6868	12653.8	.04620	96.3963	.00116	352.31	166.51	.00380	1.07005	.6950
800.	20.3262	14191.8	.04480	94.1434	.00104	384.06	180.30	.00461	1.06260	.6929
900.	18.4117	15783.0	.04352	92.3908	.00094	416.89	193.88	.00548	1.05659	.6912
1000.	16.8270	17435.7	.04231	90.9932	.00086	450.67	207.20	.00642	1.05163	.6900
1200.	14.3550	20924.5	.04006	88.9164	.00073	511.13	233.11	.00834	1.04393	.7012
1400.	12.5150	24647.4	.03803	87.4585	.00064	583.31	258.07	.01062	1.03822	.6992
1600.	11.0919	28509.6	.03636	86.3863	.00057	655.29	282.16	.01312	1.03382	.6982
1800.	9.9587	32469.6	.03498	85.5686	.00051	726.68	305.44	.01583	1.03033	.6974
2000.	9.0348	36587.9	.03374	84.9255	.00046	799.56	327.94	.01877	1.02749	.6962
2200.	8.2669	40931.2	.03255	84.4043	.00042	876.69	344.88	.02196	1.02513	.6839
2400.	7.6181	45626.0	.03131	83.9666	.00039	962.93	366.20	.02546	1.02314	.6797
2600.	7.0617	50859.0	.02995	83.5806	.00036	1065.29	387.04	.02937	1.02144	.6718
2800.	6.5780	56873.5	.02841	83.2172	.00034	1192.87	407.50	.03383	1.01996	.6592
3000.	6.1518	63952.0	.02668	82.8475	.00032	1356.25	427.69	.03839	1.01866	.6419

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

90.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 32.614	.00991	4.8726	1.492	-182.9	709.3	6.197	6.48	7.94	2444.
33.	.00993	4.8621	1.489	-180.9	712.4	6.291	6.51	7.99	2443.
34.	.00996	4.8345	1.482	-175.6	720.4	6.531	6.59	8.12	2441.
35.	.00999	4.8065	1.474	-170.1	728.6	6.769	6.67	8.24	2438.
36.	.01002	4.7780	1.466	-164.6	736.9	7.003	6.74	8.36	2435.
37.	.01005	4.7491	1.458	-158.9	745.3	7.233	6.81	8.48	2432.
38.	.01008	4.7198	1.450	-153.2	753.9	7.461	6.87	8.59	2429.
39.	.01011	4.6902	1.441	-147.4	762.5	7.685	6.93	8.69	2426.
40.	.01014	4.6602	1.432	-141.5	771.3	7.907	6.98	8.79	2423.
42.	.01021	4.5996	1.415	-129.4	789.0	8.340	7.08	8.98	2416.
44.	.01027	4.5382	1.397	-117.1	807.2	8.762	7.18	9.17	2408.
46.	.01033	4.4764	1.379	-104.9	825.2	9.163	7.31	9.40	2399.
48.	.01040	4.4143	1.360	-91.9	844.2	9.567	7.42	9.60	2389.
50.	.01047	4.3522	1.342	-78.5	863.6	9.963	7.53	9.80	2379.
52.	.01054	4.2904	1.323	-64.9	883.4	10.351	7.63	9.99	2370.
54.	.01061	4.2290	1.304	-50.9	903.6	10.731	7.73	10.17	2359.
56.	.01068	4.1684	1.286	-36.4	924.3	11.109	7.82	10.35	2349.
58.	.01075	4.1087	1.267	-21.9	945.2	11.475	7.90	10.51	2339.
60.	.01082	4.0500	1.248	-7.2	966.4	11.835	7.98	10.68	2328.
65.	.01100	3.9093	1.201	30.8	1020.9	12.707	8.21	11.11	2300.
70.	.01119	3.7786	1.153	70.6	1077.6	13.547	8.48	11.57	2270.
75.	.01138	3.6597	1.105	112.2	1136.6	14.361	8.79	12.04	2238.
80.	.01158	3.5532	1.058	155.8	1198.0	15.153	9.14	12.52	2206.
85.	.01178	3.4592	1.011	201.5	1261.8	15.927	9.52	13.00	2174.
90.	.01199	3.3767	.9648	249.3	1328.0	16.684	9.91	13.48	2143.
95.	.01219	3.3041	.9199	299.3	1396.6	17.425	10.32	13.93	2112.
100.	.01243	3.2490	.8965	351.4	1469.9	18.176	10.71	14.53	2100.
110.	.01285	3.1374	.8228	464.2	1620.9	19.614	11.57	15.49	2050.
120.	.01329	3.0689	.7615	583.5	1779.7	20.996	12.23	16.24	2018.
130.	.01373	2.9922	.7081	709.2	1945.2	22.320	12.76	16.87	1989.
140.	.01418	2.9813	.6595	839.6	2116.1	23.587	13.13	17.24	1978.
160.	.01508	2.8959	.5722	1107.7	2464.6	25.913	13.44	17.55	1945.
180.	.01599	2.7697	.5084	1377.0	2816.1	27.983	13.34	17.63	1913.
200.	.01693	2.7672	.4587	1642.3	3165.9	29.826	13.04	17.40	1921.
220.	.01787	2.8492	.4157	1900.9	3509.1	31.462	12.69	16.95	1951.
240.	.01880	2.8914	.3780	2152.1	3844.1	32.920	12.35	16.55	1968.
260.	.01972	2.9172	.3463	2396.6	4171.6	34.231	12.08	16.24	1980.
280.	.02065	2.9541	.3196	2635.4	4493.5	35.424	11.86	15.99	1995.
300.	.02163	3.0270	.3042	2848.3	4795.1	36.437	11.35	15.65	2042.
350.	.02397	3.1770	.2578	3409.2	5566.6	38.815	11.04	15.25	2095.
400.	.02629	3.3404	.2236	3956.6	6323.0	40.836	10.88	15.02	2147.
450.	.02860	3.5114	.1975	4496.3	7070.3	42.598	10.81	14.89	2200.
500.	.03090	3.6874	.1769	5032.4	7813.0	44.162	10.75	14.81	2253.
550.	.03318	3.8667	.1603	5565.3	8551.6	45.570	10.73	14.75	2306.
600.	.03546	4.0486	.1466	6097.0	9288.5	46.851	10.71	14.72	2358.
700.	.04001	4.4178	.1253	7158.7	10759.5	49.120	10.73	14.71	2461.
800.	.04455	4.7929	.1096	8223.7	12232.8	51.086	10.79	14.76	2561.
900.	.04908	5.1726	.0974	9296.5	13713.8	52.828	10.89	14.86	2657.
1000.	.05362	5.5561	.0877	10381.2	15206.6	54.404	11.03	15.01	2749.
1200.	.06269	6.3323	.0731	12602.3	18244.4	57.160	11.39	15.37	2924.
1400.	.07177	7.1179	.0628	14902.4	21362.0	59.567	11.80	15.80	3087.
1600.	.08087	7.9107	.0550	17286.0	24564.0	61.682	12.20	16.21	3241.
1800.	.08997	8.7088	.0490	19752.8	27850.2	63.579	12.57	16.59	3390.
2000.	.09909	9.5111	.0442	22302.2	31219.9	65.420	12.94	16.97	3531.
2200.	.10821	10.3168	.0402	24925.8	34664.9	67.734	13.33	17.38	3667.
2400.	.11736	11.1250	.0369	27635.5	38197.7	70.317	13.79	17.85	3795.
2600.	.12654	11.9355	.0341	30447.6	41836.2	73.077	14.35	18.45	3918.
2800.	.13578	12.7476	.0317	33389.2	45609.5	75.871	15.06	19.23	4034.
3000.	.14512	13.5613	.0296	36497.5	49558.7	78.534	15.98	20.24	4144.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

90.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 32.614	100.8714	2616.4	.22833	491.5039	.00304	263.61	857.52	.00118	1.33730	2.5839
33.	100.7531	2629.0	.22707	489.8700	.00304	263.77	827.99	.00118	1.33687	2.5091
34.	100.4467	2661.2	.22386	485.6133	.00305	264.08	759.30	.00117	1.33575	2.3349
35.	100.1401	2691.8	.22082	481.3228	.00306	264.16	700.18	.00115	1.33462	2.1852
36.	99.8333	2721.1	.21794	477.0030	.00307	264.04	648.95	.00114	1.33350	2.0556
37.	99.5264	2748.9	.21519	472.6586	.00308	263.73	604.29	.00113	1.33238	1.9428
38.	99.2193	2774.7	.21265	468.2939	.00310	263.28	565.12	.00111	1.33125	1.8436
39.	98.9121	2797.8	.21036	463.9132	.00311	262.69	530.59	.00110	1.33013	1.7554
40.	98.6048	2819.6	.20819	459.5205	.00312	261.99	499.99	.00109	1.32900	1.6774
42.	97.9899	2861.3	.20398	450.7152	.00314	260.22	448.40	.00106	1.32676	1.5477
44.	97.3745	2902.1	.19984	441.9079	.00316	258.16	406.84	.00104	1.32451	1.4456
46.	96.7587	2951.9	.19492	433.1268	.00318	255.91	372.86	.00101	1.32227	1.3690
48.	96.1426	2995.2	.19059	424.3983	.00321	253.52	344.72	.00099	1.32003	1.3053
50.	95.5262	3035.4	.18654	415.7470	.00323	251.04	321.14	.00097	1.31778	1.2531
52.	94.9095	3073.2	.18270	407.1958	.00325	248.52	301.17	.00094	1.31554	1.2101
54.	94.2927	3109.1	.17904	398.7661	.00327	245.98	284.10	.00092	1.31330	1.1746
56.	93.6758	3142.8	.17557	390.4774	.00329	243.45	269.39	.00090	1.31107	1.1450
58.	93.0590	3173.6	.17234	382.3478	.00331	240.96	256.61	.00089	1.30883	1.1198
60.	92.4426	3205.0	.16910	374.3937	.00333	238.83	245.43	.00087	1.30660	1.0978
65.	90.9041	3289.9	.16078	355.3682	.00338	234.76	222.87	.00084	1.30105	1.0552
70.	89.3730	3387.9	.15207	337.7071	.00341	230.85	205.89	.00080	1.29553	1.0316
75.	87.8545	3501.5	.14308	321.5186	.00344	227.26	192.71	.00077	1.29008	1.0209
80.	86.3545	3631.4	.13402	306.8348	.00345	224.18	182.23	.00075	1.28471	1.0178
85.	84.8790	3776.9	.12513	293.6117	.00344	225.18	173.71	.00073	1.27943	1.0032
90.	83.4336	3935.9	.11663	281.7316	.00342	226.16	166.66	.00072	1.27428	.9933
95.	82.0230	4105.4	.10869	271.0114	.00339	227.24	160.73	.00072	1.26927	.9856
100.	80.4651	4237.4	.10403	261.4332	.00343	227.90	154.95	.00070	1.26375	.9881
110.	77.8046	4595.2	.09142	244.1023	.00337	220.79	107.00	.00066	1.25435	.7506
120.	75.2353	4924.3	.08272	230.8886	.00330	220.92	107.28	.00065	1.24532	.7886
130.	72.8150	5189.8	.07622	217.8744	.00325	229.86	107.86	.00067	1.23685	.7915
140.	70.5036	5494.3	.07124	210.1927	.00314	241.73	108.51	.00072	1.22880	.7738
160.	66.3292	5892.5	.06418	192.0795	.00298	265.17	109.71	.00082	1.21435	.7262
180.	62.5400	6008.2	.06094	173.2180	.00293	282.58	110.71	.00092	1.20132	.6908
200.	59.0710	6200.8	.05954	163.4613	.00281	292.66	111.63	.00102	1.18948	.6637
220.	55.9659	6502.8	.05852	159.4606	.00261	296.67	112.53	.00113	1.17895	.6433
240.	53.1923	6734.3	.05750	153.7984	.00246	296.64	113.70	.00121	1.16960	.6343
260.	50.7026	6935.2	.05654	147.9087	.00234	294.42	114.97	.00129	1.16124	.6341
280.	48.4373	7157.2	.05564	143.0900	.00223	291.41	116.44	.00135	1.15368	.6387
300.	46.2315	7199.7	.05793	139.9443	.00217	288.51	118.09	.00144	1.14634	.6406
350.	41.7167	7841.3	.05595	132.5354	.00194	284.45	122.91	.00161	1.13143	.6590
400.	38.0322	8535.3	.05402	127.0413	.00176	286.09	128.50	.00180	1.11936	.6748
450.	34.9644	9258.7	.05228	122.7753	.00161	292.42	134.60	.00202	1.10938	.6856
500.	32.3671	9987.5	.05083	119.3503	.00148	302.01	141.02	.00227	1.10098	.6914
550.	30.1370	10723.0	.04959	116.5315	.00138	313.73	147.64	.00254	1.09380	.6943
600.	28.1996	11462.5	.04853	114.1675	.00128	326.83	154.37	.00283	1.08759	.6953
700.	24.9947	12960.7	.04675	110.4230	.00114	355.57	167.94	.00348	1.07737	.6948
800.	22.4485	14498.6	.04524	107.5944	.00102	386.38	181.48	.00420	1.06930	.6934
900.	20.3744	16089.6	.04388	105.3896	.00092	418.62	194.86	.00498	1.06276	.6919
1000.	18.6513	17742.0	.04260	103.6291	.00085	452.01	208.05	.00581	1.05734	.6907
1200.	15.9516	21230.6	.04026	101.0104	.00072	511.13	233.74	.00750	1.04890	.7030
1400.	13.9327	24953.6	.03818	99.1723	.00063	583.30	258.57	.00954	1.04262	.7004
1600.	12.3659	28815.3	.03646	97.8224	.00056	655.28	282.57	.01177	1.03776	.6990
1800.	11.1146	32773.5	.03506	96.7950	.00051	726.63	305.78	.01419	1.03389	.6981
2000.	10.0923	36887.5	.03381	95.9893	.00046	799.36	328.23	.01680	1.03074	.6967
2200.	9.2412	41219.7	.03262	95.3389	.00042	876.09	344.88	.01964	1.02812	.6840
2400.	8.5210	45889.8	.03139	94.7961	.00039	961.36	366.19	.02275	1.02591	.6801
2600.	7.9027	51073.6	.03005	94.3223	.00036	1061.81	387.03	.02621	1.02402	.6726
2800.	7.3648	57000.8	.02855	93.8833	.00034	1186.00	407.48	.03015	1.02237	.6606
3000.	6.8906	63938.3	.02687	93.4458	.00032	1343.93	427.66	.03469	1.02092	.6441

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

100.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ KG-K	CP	VELOCITY OF SOUND M/S
* 34.169	.00977	5.2095	1.542	-166.3	810.4	6.279	6.60	8.08	2527.
35.	.00979	5.1881	1.535	-161.9	817.2	6.474	6.66	8.18	2525.
36.	.00982	5.1618	1.526	-156.5	825.4	6.706	6.73	8.30	2522.
37.	.00985	5.1350	1.517	-151.0	833.8	6.935	6.81	8.41	2520.
38.	.00988	5.1078	1.508	-145.4	842.2	7.161	6.87	8.52	2517.
39.	.00990	5.0801	1.499	-139.7	850.8	7.384	6.93	8.62	2514.
40.	.00993	5.0520	1.490	-133.9	859.5	7.603	6.98	8.72	2511.
42.	.00999	4.9948	1.472	-122.1	877.1	8.033	7.09	8.90	2505.
44.	.01005	4.9365	1.453	-110.1	895.1	8.452	7.19	9.09	2498.
46.	.01011	4.8773	1.434	-98.2	913.0	8.848	7.32	9.31	2490.
48.	.01017	4.8175	1.415	-85.4	931.8	9.249	7.44	9.51	2481.
50.	.01023	4.7573	1.396	-72.3	951.0	9.641	7.55	9.70	2472.
52.	.01029	4.6971	1.377	-58.9	970.6	10.025	7.66	9.88	2462.
54.	.01036	4.6369	1.359	-45.2	990.5	10.401	7.76	10.06	2453.
56.	.01042	4.5771	1.340	-31.0	1011.1	10.775	7.85	10.23	2443.
58.	.01048	4.5178	1.321	-16.7	1031.7	11.137	7.93	10.40	2433.
60.	.01055	4.4591	1.302	-2.2	1052.7	11.493	8.02	10.56	2423.
65.	.01071	4.3169	1.255	35.2	1106.5	12.355	8.26	10.99	2396.
70.	.01088	4.1826	1.209	74.3	1162.6	13.185	8.54	11.44	2367.
75.	.01106	4.0581	1.162	115.4	1221.0	13.991	8.87	11.92	2336.
80.	.01123	3.9448	1.116	158.5	1281.8	14.776	9.23	12.41	2304.
85.	.01141	3.8431	1.070	203.9	1345.1	15.543	9.62	12.91	2272.
90.	.01160	3.7530	1.024	251.4	1411.0	16.296	10.03	13.41	2240.
95.	.01178	3.6737	.9796	301.2	1479.2	17.034	10.44	13.89	2210.
100.	.01197	3.6035	.9357	353.3	1549.8	17.758	10.86	14.34	2181.
110.	.01234	3.4819	.8522	465.2	1698.9	19.178	11.72	15.21	2126.
120.	.01276	3.3346	.8066	584.0	1860.0	20.580	12.38	16.19	2088.
130.	.01315	3.2230	.7503	709.2	2024.5	21.896	12.91	16.83	2050.
140.	.01355	3.1987	.7030	839.3	2194.3	23.155	13.28	17.25	2039.
160.	.01437	3.1972	.6180	1107.5	2544.5	25.493	13.59	17.53	2031.
180.	.01517	3.1143	.5439	1377.3	2893.9	27.551	13.49	17.42	2005.
200.	.01597	2.9502	.4914	1642.2	3239.6	29.372	13.18	17.36	1971.
220.	.01684	2.9419	.4488	1900.6	3584.7	31.017	12.82	17.09	1981.
240.	.01768	3.0865	.4119	2152.3	3920.5	32.478	12.48	16.60	2026.
260.	.01852	3.1323	.3779	2397.5	4249.2	33.794	12.20	16.26	2044.
280.	.01934	3.1686	.3488	2637.2	4571.2	34.988	11.97	15.99	2057.
300.	.02024	3.2500	.3354	2847.0	4870.5	35.991	11.42	15.57	2112.
350.	.02234	3.3883	.2846	3409.3	5643.3	38.373	11.10	15.28	2159.
400.	.02443	3.5426	.2470	3958.2	6400.9	40.398	10.94	15.05	2208.
450.	.02650	3.7063	.2182	4499.3	7149.3	42.162	10.86	14.92	2257.
500.	.02856	3.8759	.1955	5036.7	7892.9	43.728	10.80	14.82	2306.
550.	.03061	4.0497	.1771	5570.9	8632.3	45.137	10.77	14.77	2356.
600.	.03266	4.2264	.1620	6103.7	9369.9	46.419	10.76	14.73	2406.
700.	.03674	4.5866	.1385	7167.4	10841.7	48.690	10.77	14.72	2504.
800.	.04082	4.9536	.1210	8233.9	12315.4	50.656	10.82	14.76	2599.
900.	.04488	5.3261	.1076	9308.1	13796.5	52.399	10.93	14.86	2692.
1000.	.04895	5.7030	.0968	10393.9	15289.2	53.974	11.06	15.01	2781.
1200.	.05710	6.4678	.0808	12616.8	18326.5	56.730	11.42	15.37	2951.
1400.	.06525	7.2439	.0694	14918.2	21443.4	59.136	11.83	15.80	3110.
1600.	.07342	8.0286	.0609	17302.8	24644.6	61.251	12.23	16.21	3262.
1800.	.08160	8.8200	.0542	19770.4	27930.0	63.148	12.59	16.58	3408.
2000.	.08978	9.6165	.0489	22320.2	31298.6	64.988	12.96	16.96	3548.
2200.	.09798	10.4171	.0445	24943.7	34742.1	67.301	13.35	17.37	3682.
2400.	.10620	11.2210	.0408	27651.8	38272.3	69.883	13.79	17.84	3809.
2600.	.11446	12.0275	.0377	30460.2	41905.8	72.641	14.34	18.42	3931.
2800.	.12276	12.8363	.0351	33394.0	45670.1	75.432	15.03	19.17	4046.
3000.	.13115	13.6469	.0328	36488.4	49603.8	78.089	15.91	20.14	4156.

* TWO-PHASE BOUNDARY

TABLE 2

THERMODYNAMIC PROPERTIES OF PARAHYDROGEN (ISOBARS, SI UNITS)

100.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 34.169	102.3875	2796.3	.22830	533.3893	.00289	276.26	937.81	.00120	1.34287	2.7436
35.	102.1417	2825.5	.22560	529.9203	.00290	276.34	870.98	.00119	1.34197	2.5791
36.	101.8460	2859.4	.22250	525.7090	.00290	276.25	800.91	.00118	1.34088	2.4065
37.	101.5504	2891.7	.21955	521.4625	.00291	275.96	740.27	.00116	1.33980	2.2570
38.	101.2550	2921.8	.21682	517.1855	.00292	275.51	687.46	.00115	1.33871	2.1263
39.	100.9598	2949.0	.21436	512.8820	.00292	274.92	641.22	.00114	1.33763	2.0108
40.	100.6647	2974.8	.21203	508.5564	.00293	274.20	600.50	.00112	1.33655	1.9090
42.	100.0751	3024.3	.20754	499.8546	.00294	272.38	532.43	.00110	1.33439	1.7436
44.	99.4861	3072.7	.20314	491.1104	.00296	270.25	478.19	.00108	1.33223	1.6086
46.	98.8978	3130.6	.19798	482.3525	.00297	267.90	434.26	.00105	1.33008	1.5038
48.	98.3099	3181.3	.19345	473.6076	.00299	265.41	398.20	.00102	1.32793	1.4263
50.	97.7226	3228.6	.18922	464.9006	.00300	262.83	368.22	.00100	1.32578	1.3586
52.	97.1359	3273.1	.18524	456.2550	.00302	260.20	343.02	.00098	1.32364	1.3028
54.	96.5496	3315.5	.18144	447.6927	.00303	257.54	321.63	.00095	1.32151	1.2565
56.	95.9639	3355.2	.17786	439.2340	.00305	254.90	303.31	.00093	1.31937	1.2178
58.	95.3788	3391.6	.17454	430.8979	.00307	252.29	287.50	.00092	1.31725	1.1849
60.	94.7943	3428.5	.17122	422.7017	.00308	250.06	273.74	.00090	1.31512	1.1563
65.	93.3370	3526.6	.16276	402.9244	.00312	245.78	246.24	.00086	1.30984	1.1009
70.	91.8870	3637.2	.15398	384.3249	.00315	241.67	225.80	.00083	1.30459	1.0690
75.	90.4480	3763.4	.14496	367.0497	.00317	237.86	210.14	.00079	1.29940	1.0529
80.	89.0241	3905.9	.13589	351.1813	.00318	234.58	197.82	.00076	1.29428	1.0468
85.	87.6203	4064.2	.12700	336.7366	.00318	235.54	187.92	.00075	1.28924	1.0304
90.	86.2414	4236.7	.11848	323.6679	.00317	236.46	179.81	.00074	1.28430	1.0197
95.	84.8920	4421.2	.11049	311.8664	.00314	237.48	173.06	.00073	1.27948	1.0120
100.	83.5760	4614.4	.10311	301.1690	.00311	238.70	167.36	.00072	1.27479	1.0052
110.	81.0536	5037.1	.08973	282.2177	.00302	226.67	109.58	.00066	1.26583	.7353
120.	78.3682	5246.8	.08312	261.3250	.00309	226.49	110.23	.00064	1.25634	.7881
130.	76.0329	5498.1	.07646	245.0524	.00306	236.40	111.17	.00066	1.24812	.7916
140.	73.7994	5791.3	.07176	236.0605	.00298	250.00	112.16	.00071	1.24029	.7738
160.	69.5909	6312.1	.06536	222.4929	.00278	278.17	113.90	.00082	1.22563	.7178
180.	65.9363	6578.4	.06114	205.3481	.00265	300.77	115.24	.00094	1.21299	.6675
200.	62.6024	6524.4	.05955	184.6887	.00266	315.25	116.31	.00104	1.20154	.6406
220.	59.3817	6650.9	.05898	174.6977	.00257	322.23	117.30	.00114	1.19054	.6221
240.	56.5559	7036.2	.05836	174.5602	.00236	323.62	118.33	.00124	1.18095	.6071
260.	54.0061	7278.9	.05737	169.1637	.00223	321.52	119.47	.00132	1.17234	.6042
280.	51.7071	7513.4	.05633	163.8406	.00213	317.67	120.77	.00138	1.16461	.6080
300.	49.4193	7504.2	.05944	160.6133	.00209	313.32	122.22	.00146	1.15695	.6113
350.	44.7643	8142.5	.05726	151.6740	.00188	304.64	126.54	.00160	1.14148	.6345
400.	40.9388	8836.4	.05515	145.0297	.00170	301.82	131.66	.00176	1.12888	.6564
450.	37.7361	9561.1	.05326	139.8609	.00156	304.57	137.36	.00195	1.11840	.6727
500.	35.0120	10291.3	.05168	135.7041	.00144	311.45	143.44	.00216	1.10953	.6828
550.	32.6639	11028.1	.05033	132.2775	.00134	321.15	149.78	.00240	1.10193	.6887
600.	30.6169	11768.7	.04918	129.3991	.00125	332.75	156.27	.00266	1.09534	.6918
700.	27.2161	13268.3	.04725	124.8291	.00111	359.51	169.47	.00323	1.08444	.6938
800.	24.5007	14806.7	.04564	121.3674	.00100	389.16	182.74	.00387	1.07580	.6933
900.	22.2795	16397.7	.04419	118.6628	.00091	420.67	195.92	.00457	1.06876	.6923
1000.	20.4277	18050.0	.04285	116.4995	.00083	453.59	208.95	.00533	1.06292	.6912
1200.	17.5141	21538.1	.04043	113.2774	.00071	511.13	234.43	.00684	1.05378	.7049
1400.	15.3253	25260.6	.03829	111.0148	.00063	583.30	259.11	.00867	1.04695	.7017
1600.	13.6206	29121.1	.03654	109.3547	.00056	655.28	283.01	.01069	1.04165	.7000
1800.	12.2556	33076.7	.03512	108.0935	.00050	726.59	306.15	.01287	1.03742	.6988
2000.	11.1379	37185.9	.03385	107.1068	.00046	799.20	328.54	.01523	1.03397	.6973
2200.	10.2057	41507.8	.03266	106.3132	.00042	875.57	344.88	.01778	1.03109	.6840
2400.	9.4158	46155.9	.03144	105.6544	.00039	960.03	366.19	.02058	1.02866	.6803
2600.	8.7370	51297.3	.03012	105.0844	.00036	1058.86	387.03	.02369	1.02657	.6732
2800.	8.1459	57149.9	.02865	104.5631	.00034	1180.19	407.47	.02721	1.02476	.6618
3000.	7.6246	63967.6	.02702	104.0528	.00031	1333.50	427.63	.03126	1.02316	.6460

* TWO-PHASE BOUNDARY

Table 3
THERMODYNAMIC PROPERTIES OF COEXISTING GASEOUS AND LIQUID PARAHYDROGEN

Temperature, K	Density, kg/m³	$V(\partial H/\partial V)_P$, kJ/kg	$V(\partial P/\partial U)_V$, MPa-m³/kJ × 10²	$-V(\partial P/\partial V)_T$, MPa	$(\partial V/\partial T)_P/V$, 1/K	Thermal conductivity, W/K-m × 10³	Viscosity, kg/m-s × 10⁷	Thermal diffusivity, m²/h	Dielectric constant	Prandtl number
13.800[a]	77.0235	622.6	0.25654	90.3401	0.01022	72.59	255.05	0.00053	1.25160	2.2359
	0.1254	139.8	0.06684	0.0069	0.07523	12.43	7.36	0.03395	1.00038	0.6230
14	76.8554	619.2	0.25480	88.3211	0.01046	74.62	248.01	0.00054	1.25101	2.1517
	0.1388	141.6	0.06684	0.0077	0.07441	12.54	7.48	0.03084	1.00042	0.6291
15	75.9963	621.9	0.24237	81.5880	0.01111	83.02	217.84	0.00057	1.24799	1.8128
	0.2228	150.5	0.06683	0.0131	0.07089	13.08	8.08	0.01981	1.00067	0.6591
16	75.1030	623.0	0.23130	75.3083	0.01181	88.86	194.15	0.00058	1.24486	1.6074
	0.3385	159.1	0.06680	0.0208	0.06820	13.66	8.68	0.01339	1.00102	0.6891
17	74.1710	613.1	0.22244	68.0612	0.01286	92.71	175.07	0.00057	1.24159	1.4884
	0.4922	167.1	0.06674	0.0313	0.06624	14.27	9.28	0.00943	1.00148	0.7197
18	73.1950	604.3	0.21509	61.7874	0.01394	95.43	159.34	0.00056	0.23818	1.4063
	0.6902	174.6	0.06669	0.0452	0.06495	14.97	9.88	0.00689	1.00208	0.7484
19	72.1693	601.0	0.20874	56.9619	0.01486	97.00	146.10	0.00054	1.23460	1.3451
	0.9395	181.4	0.06665	0.0626	0.06427	15.72	10.49	0.00517	1.00283	0.7783
20	71.0870	596.1	0.20314	52.3516	0.01585	98.40	134.76	0.00053	1.23083	1.2942
	1.2474	187.6	0.06666	0.0840	0.06420	16.64	11.11	0.00399	1.00376	0.8042
20.268[a]	70.7864	587.9	0.20176	50.2079	0.01644	98.92	131.98	0.00052	1.22978	1.2893
	1.3378	189.1	0.06667	0.0903	0.06424	16.94	11.28	0.00375	1.00404	0.8091
21	69.9403	577.8	0.19814	46.2935	0.01754	100.05	124.87	0.00051	1.22684	1.2648
	1.6189	193.0	0.06672	0.1093	0.06471	17.79	11.74	0.00317	1.00489	0.8241
22	68.7200	563.1	0.19347	41.1835	0.01921	100.95	116.11	0.00049	1.22261	1.2444
	2.0711	197.5	0.06686	0.1388	0.06597	19.02	12.38	0.00254	1.00625	0.8481
23	67.4149	540.5	0.18882	35.4854	0.02162	101.20	108.22	0.00046	1.21810	1.2499
	2.6119	201.2	0.06708	0.1719	0.06804	20.36	13.04	0.00205	1.00789	0.8769

[a] Two-phase boundary.

Table 3 (continued)
THERMODYNAMIC PROPERTIES OF COEXISTING GASEOUS AND LIQUID PARAHYDROGEN

Temperature, K	Density, kg/m^3	$V(\partial H/\partial V)_p$, kJ/kg	$V(\partial P/\partial U)_V$, MPa-m^3/kJ $\times 10^2$	$-V(\partial P/\partial T)_T$, MPa	$(\partial V/\partial T)_p/V$, 1/K	Thermal conductivity, W/K-m $\times 10^3$	Viscosity, kg/m-s $\times 10^7$	Thermal diffusivity, m^2/h	Dielectric constant	Prandtl number
24	66.0112	523.0	0.18378	30.8574	0.02394	100.84	101.01	0.00044	1.21325	1.2543
	3.2548	203.9	0.06739	0.2081	0.07108	21.81	13.73	0.00166	1.00984	0.9123
25	64.4917	504.2	0.17820	26.4945	0.02665	99.93	94.32	0.00042	1.20802	1.2682
	4.0171	205.8	0.06777	0.2460	0.07540	23.43	14.44	0.00135	1.01216	0.9567
26	62.8337	475.1	0.17151	21.4244	0.03116	98.43	88.03	0.00038	1.20233	1.3240
	4.9215	206.9	0.06822	0.2842	0.08144	25.24	15.19	0.00110	1.01491	1.0145
27	61.0065	451.1	0.16381	17.4346	0.03585	96.38	82.02	0.00035	1.19608	1.3764
	5.9999	207.3	0.06868	0.3201	0.09002	27.36	16.00	0.00088	1.01820	1.0916
28	58.9665	418.4	0.15535	13.1188	0.04417	93.78	76.19	0.00031	1.18913	1.5012
	7.2979	207.1	0.06912	0.3498	0.10259	29.91	16.89	0.00069	1.02216	1.1997
29	56.6460	382.6	0.14600	9.1967	0.05763	90.55	70.42	0.00026	1.18125	1.7146
	8.8866	206.2	0.06947	0.3676	0.12220	33.18	17.91	0.00053	1.02703	1.3601
30	53.9303	350.6	0.13555	6.2743	0.07585	86.57	64.57	0.00022	1.17208	1.9834
	10.8872	204.7	0.06965	0.3638	0.15631	37.87	19.17	0.00039	1.03319	1.6195
31	50.5892	310.8	0.12320	3.5282	0.11759	85.85	58.40	0.00017	1.16087	2.4889
	13.5411	202.6	0.06952	0.3205	0.22979	46.48	20.89	0.00027	1.04140	2.0930
32	45.9927	265.8	0.10744	1.3886	0.24599	91.46	51.31	0.00011	1.14555	3.6672
	17.4983	199.1	0.06952	0.2258	0.43710	66.77	23.79	0.00016	1.05373	3.1004
32.976[a]	31.4285	199.0					35.43		1.09795	

[a] Two-phase boundary.

Table 3 (continued)
THERMODYNAMIC PROPERTIES OF COEXISTING GASEOUS AND LIQUID PARAHYDROGEN

Temperature, K	Pressure, MPa	Isotherm derivative, m^3-MPa/kg	Isochore derivative, MPa/K	Internal energy, kJ/kg-K	Enthalpy, kJ/kg	Entropy, kJ/kg-K	C_V, kJ/kg-K	C_p, kJ/kg-K	Velocity of sound, m/s	Surface tension, N/m × 10^3
13.800[a]	0.0070	1.1729	0.9234	−309.0	−308.9	4.964	4.67	6.36	1264	2.9910
	0.0070	0.0552	0.0005	84.2	140.3	37.520	6.21	10.52	306	
14	0.0079	1.1492	0.9234	−307.6	−307.5	5.057	4.72	6.47	1256	2.9578
	0.0079	0.0558	0.0006	85.3	142.1	37.135	6.21	10.54	308	
15	0.0134	1.0736	0.9064	−300.9	−300.7	5.525	4.92	6.91	1228	2.7921
	0.0134	0.0588	0.0009	90.7	151.1	35.648	6.24	10.67	317	
16	0.0216	1.0027	0.8893	−293.7	−293.4	5.989	5.12	7.36	1200	2.6270
	0.0216	0.0615	0.0014	95.9	159.6	34.303	6.27	10.85	326	
17	0.0329	0.9176	0.8750	−286.0	−285.6	6.453	5.30	7.88	1168	2.4625
	0.0329	0.0637	0.0021	100.7	167.6	33.111	6.32	11.07	334	
18	0.0482	0.8441	0.8612	−277.9	−277.3	6.917	5.47	8.42	1140	2.2987
	0.0482	0.0654	0.0029	105.1	175.0	32.042	6.37	11.34	341	
19	0.0682	0.7893	0.8465	−269.3	−268.4	7.382	5.62	8.93	1120	2.1356
	0.0682	0.0667	0.0040	109.1	181.7	31.073	6.43	11.66	348	
20	0.0935	0.7364	0.8300	−260.2	−258.9	7.851	5.75	9.45	1100	1.9732
	0.0935	0.0674	0.0054	112.7	187.6	30.184	6.49	12.04	354	
20.268[a]	0.1013	0.7093	0.8253	−257.7	−256.2	7.977	5.78	9.66	1089	1.9299
	0.1013	0.0675	0.0058	113.6	189.3	29.967	6.50	12.15	355	
21	0.1250	0.6619	0.8119	−250.5	−248.8	8.323	5.86	10.13	1070	1.8117
	0.1250	0.0675	0.0071	115.8	193.0	29.369	6.55	12.49	359	
22	0.1634	0.5993	0.7913	−240.3	−237.9	8.802	5.95	10.82	1044	1.6510
	0.1634	0.0670	0.0092	118.3	197.2	28.592	6.61	13.03	363	
23	0.2096	0.5264	0.7673	−229.4	−226.3	9.287	6.03	11.69	1010	1.4913
	0.2096	0.0658	0.0117	120.2	200.5	27.855	6.68	13.69	367	

[a] Two-phase boundary.

Table 3 (continued)
THERMODYNAMIC PROPERTIES OF COEXISTING GASEOUS AND LIQUID PARAHYDROGEN

Temperature, K	Pressure, MPa	Isotherm derivative, m^3-MPa/kg	Isochore derivative, MPa/K	Internal energy, kJ/kg-K	Enthalpy, kJ/kg	Entropy, kJ/kg-K	C_V, kJ/kg-K	C_p, kJ/kg-K	Velocity of sound, m/s	Surface tension, N/m × 10^3
24	0.2645	0.4675	0.7389	−217.9	−213.8	9.783	6.09	12.52	980	1.3327
	0.2645	0.0639	0.0148	121.4	202.6	27.148	6.74	14.49	371	
25	0.3288	0.4108	0.7060	−205.5	−200.4	10.291	6.14	13.44	948	1.1751
	0.3288	0.0613	0.0186	121.7	203.6	26.461	6.81	15.52	373	
26	0.4035	0.3410	0.6676	−192.3	−185.9	10.813	6.20	14.80	903	1.0189
	0.4035	0.0578	0.0231	121.1	203.1	25.784	6.89	16.85	376	
27	0.4892	0.2858	0.6251	−178.2	−170.1	11.356	6.26	16.17	860	0.8641
	0.4892	0.0533	0.0288	119.3	200.8	25.104	6.99	18.66	377	
28	0.5871	0.2225	0.5794	−162.8	−152.8	11.926	6.33	18.48	806	0.7110
	0.5871	0.0479	0.0359	116.1	196.5	24.409	7.11	21.24	378	
29	0.6978	0.1624	0.5300	−145.9	−133.6	12.535	6.41	22.05	747	0.5599
	0.6978	0.0414	0.0449	110.9	189.5	23.680	7.28	25.19	378	
30	0.8225	0.1163	0.4759	−126.9	−111.7	13.200	6.51	26.59	689	0.4112
	0.8225	0.0334	0.0569	103.2	178.8	22.887	7.50	31.99	378	
31	0.9627	0.0697	0.4149	−104.9	−85.8	13.960	6.66	36.55	619	0.2659
	0.9627	0.0237	0.0736	91.5	162.6	21.976	7.82	46.56	375	
32	1.1198	0.0302	0.3416	−76.7	−52.4	14.917	6.91	65.37	534	0.1254
	1.1198	0.0129	0.0987	72.1	136.1	20.811	8.11	87.02	372	
32.976[a]	1.2928		0.1898	−2.8	38.3	17.565				0.0000

[a] Two-phase boundary.

Table 4
SECOND AND THIRD VIRIAL COEFFICIENTS
FOR PARAHYDROGEN

Temperature, K	B (cm^3 / mol)	C (cm^3 / mol)^2
14	-2.372×10^2	-6.713×10^4
16	-1.992×10^2	-2.265×10^4
18	-1.698×10^2	-7.121×10^3
20	-1.467×10^2	-1.503×10^3
22	-1.281×10^2	5.656×10^2
24	-1.129×10^2	1.323×10^3
26	-1.003×10^2	1.580×10^3
28	-8.969×10^1	1.640×10^3
30	-8.066×10^1	1.615×10^3
32	-7.290×10^1	1.550×10^3
34	-6.615×10^1	1.467×10^3
36	-6.025×10^1	1.376×10^3
38	-5.504×10^1	1.290×10^3
40	-5.042×10^1	1.214×10^3
45	-4.086×10^1	1.066×10^3
50	-3.343×10^1	9.638×10^2
60	-2.264×10^1	8.351×10^2
70	-1.522×10^1	7.510×10^2
80	-9.824×10	6.878×10^2
90	-5.725×10	6.405×10^2
100	-2.510×10	6.085×10^2
120	2.144×10	5.491×10^2
140	5.342×10	5.063×10^2
160	7.654×10	4.726×10^2
180	9.388×10	4.449×10^2
200	1.073×10^1	4.217×10^2
250	1.300×10^1	3.768×10^2
300	1.438×10^1	3.438×10^2
400	1.589×10^1	2.976×10^2
500	1.660×10^1	2.661×10^2

Table 5
FIXED POINT PROPERTIES OF PARAHYDROGEN

Properties	Conditions: Triple point Solid	Triple point Liquid	Triple point Vapor	Normal boiling point Liquid	Normal boiling point Vapor	Critical point[a]	Standard conditions STP(0°C)	Standard conditions NTP(20°C)	References and notes[b]
Temperature (K)	13.803	13.803	13.803	20.268		32.976	273.15	293.15	4
Pressure (mm Hg) ℓ	52.82	52.82	52.85	760		9696.8	760	760	4
Density (mol/cm³) × 10³	42.91[133]	38.207	0.0623	35.11	0.6636	15.59	0.5459	0.04155	3,4
Specific volume (cm³/mol) × 10⁻³	0.02330[133]	0.026173	16.057	0.028482	1.5069	0.064144	22.425	24.069	3,4
Compressibility factor, $Z = \frac{PV}{RT}$		0.001606	0.9850	0.01712	0.9061	0.3025	1.0005	1.0006	f
Heats of fusion and vaporization (J/mol)	117.5[129]	905.5		898.3		0	–	–	g
Specific heat (J/mol-K)									
C_σ, at saturation	5.73[110]	13.85	-46.94	18.91	-33.28	(Very large)	–	–	110,134
C_p, at constant pressure		13.13	21.20	19.53	24.50	(Very large)	30.35	30.02	3,4
C_v, at constant volume	–	9.50	12.52	11.57	13.11	19.7	21.87	21.70	3,4
Specific heat ratio, $\gamma = C_p/C_v$	–	1.382	1.693	1.688	1.869	(Large)	1.388	1.383	h
Enthalpy (J/mol)	-740.2[129]	-622.7	282.8	-516.6	381.7	77.6	7656.6	8260.6	3,4[i]
Internal energy (J/mol)	-740.4[h]	-622.9	169.8	-519.5	229.0	5.7	5384.5	5822.0	3,4[i]
Entropy (J/mol-K)	1.49[129]	10.00	75.63	16.08	60.41	35.4	127.77	129.90	3,4[i]
Velocity of sound (m/s)		1273	305	1093	355	350	1246	1294	4,7
Viscosity, μ	–								
N-s/m² × 10³	–	0.026	0.00074	0.0132	0.0011	0.0035	0.00839	0.00881	128,136,137
Centipoise[c]	–	0.026	0.00074	0.0132	0.0011	0.0035	0.00839	0.00881	128,136,137
Thermal conductivity (mW/cm-K), k	9.0[135]	0.73	0.124	0.99	0.169	e	1.841	1.914	125,128,136
Prandtl number, $N_{pr} = \mu C_p/k$	–	2.24	0.623	1.29	0.809		0.6866	0.6855	
Dielectric constant, ϵ	1.286	1.252	1.00038	1.230	1.0040	1.098	1.00027	1.00026	131
Index of refraction,[d] $n = \sqrt{\epsilon}$	1.134	1.119	1.00019	1.109	1.0020	1.048	1.00013	1.00012	114[j]
Surface tension (N/m) × 10³	–	2.99	–	1.93	–	0	–	–	123
Equiv. vol/vol liquid at NBT	0.8181	0.9190	563.8	1	52.91	2.252	787.4	845.1	k

Note: Gas constant – R = 8.31434 J•mol^{-1}•K^{-1}; Molecular weight[111] = 2.01594; Mole = gram mole.

[a] Values in parentheses are estimates.

[b] Apply to all items on the line except for specific values separately referenced by superscript.

[c] Units for poise are g/cm-s

[d] Long wavelengths.

[e] Anomalously large.

[f] Compressibility factor calculated from the tabulated data using the gas constant, R, from Reference 4.

[g] Heats of vaporization calculated from enthalpy differences given in References 3 and 4.

[h] Calculated from property values given in this table.

[i] Base point (zero values) for enthalpy, internal energy, and entropy are 0 K for the ideal gas at 0.101325 MPa (1 atm) pressure.

[j] Index of refraction calculated from the dielectric constant data given in Reference 131, in good agreement with the values reported in Reference 114.

[k] Ratio of specific volumes reported in References 3 and 4 or 110 and 132.

ℓ (mmHg) x 1.3332 x 10^{-4} = MPa.

Table 6
REFRACTIVE INDEX OF SATURATED LIQUID PARAHYDROGEN AT THREE WAVELENGTHS

	Wavelength		
Temperature, K	435.8 nm	546.2 nm	693.9 nm
15	1.1222	1.1204	1.1191
16	1.1208	1.1189	1.1177
17	1.1192	1.1174	1.1162
18	1.1176	1.1158	1.1146
19	1.1159	1.1141	1.1129
20	1.1141	1.1124	1.1112
21	1.1123	1.1106	1.1095
22	1.1103	1.1086	1.1075
23	1.1082	1.1065	1.1054
24	1.1059	1.1042	1.1032
25	1.1034	1.1018	1.1008
26	1.1007	1.0991	1.0981
27	1.0977	1.0962	1.0952
28	1.0944	1.0929	1.0920
29	1.0906	1.0892	1.0883
30	1.0862	1.0849	1.0840

Table 7
JOULE-THOMSON INVERSION CURVE (PARAHYDROGEN)

Temperature		Pressure			Density	
K	R	MPa	atm	psia	$mol/cm^3 \times 10^3$	lb_m/ft^3
28	50.4	1.000	9.87	145.1	30.06	3.783
29	52.2	1.525	15.05	221.2	29.90	3.763
30	54.0	2.035	20.08	295.1	29.73	3.742
31	55.8	2.534	25.01	367.6	29.56	3.720
32	57.6	3.025	29.85	438.7	29.40	3.700
34	61.2	3.968	39.16	575.5	29.05	3.656
36	64.8	4.870	48.06	706.3	28.70	3.612
40	72.0	6.545	64.59	949.2	27.99	3.523
50	90.0	10.02	98.93	1454	26.16	3.292
60	108.0	12.60	124.4	1828	24.30	3.058
80	144.0	15.55	153.5	2256	20.58	2.590
100	180.0	16.35	161.4	2372	17.04	2.145
120	216.0	16.42	162.1	2353	14.12	1.777
140	252.0	14.24	140.5	2064	10.86	1.367
160	288.0	10.36	102.2	1502	7.176	0.9031
180	324.0	5.165	50.97	749.1	3.321	0.4179
200	360.0	0.0547	0.54	8.6	0.036	0.0045

TABLE 8

Thermodynamic Properties of Normal Hydrogen
(Isobars, SI Units)

0.01 to 100 MPa Isobars
13.8 to 3000 K

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.01 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.804	.01298	1.1628	.9233	218.2	218.4	14.081	4.67	6.38	1260.
	14.	.01301	1.1302	.9233	219.5	219.7	14.175	4.72	6.50	1248.
*	14.430	.01307	1.1173	.9196	222.4	222.5	14.374	4.80	6.67	1245.
*	14.430	5.83386	.0571	.0007	614.8	673.2	45.613	6.22	10.59	312.
	15.	6.07554	.0596	.0007	618.4	679.2	46.023	6.22	10.56	318.
	16.	6.49796	.0640	.0006	624.8	689.7	46.703	6.21	10.52	329.
	17.	6.91887	.0683	.0006	631.0	700.2	47.339	6.20	10.49	340.
	18.	7.33861	.0725	.0006	637.3	710.7	47.938	6.20	10.46	350.
	19.	7.75743	.0768	.0005	643.6	721.2	48.503	6.20	10.44	360.
	20.	8.17550	.0810	.0005	649.8	731.6	49.038	6.20	10.43	369.
	22.	9.00988	.0895	.0005	662.3	752.4	50.033	6.20	10.41	388.
	24.	9.84245	.0979	.0004	674.8	773.2	50.938	6.19	10.39	405.
	26.	10.67369	.1062	.0004	687.3	794.0	51.767	6.19	10.38	422.
	28.	11.50391	.1146	.0004	699.7	814.7	52.535	6.19	10.37	438.
	30.	12.33332	.1229	.0003	712.1	835.5	53.250	6.19	10.36	453.
	32.	13.16210	.1313	.0003	724.5	856.2	53.919	6.19	10.35	468.
	34.	13.99036	.1396	.0003	737.0	876.9	54.546	6.19	10.35	483.
	36.	14.81819	.1479	.0003	749.4	897.6	55.138	6.19	10.34	497.
	38.	15.64568	.1562	.0003	761.8	918.2	55.697	6.19	10.34	511.
	40.	16.47288	.1645	.0003	774.2	938.9	56.227	6.19	10.34	524.
	42.	17.29983	.1728	.0002	786.6	959.6	56.732	6.19	10.34	537.
	44.	18.12657	.1811	.0002	799.0	980.3	57.212	6.20	10.34	550.
	46.	18.95313	.1893	.0002	811.4	1001.0	57.672	6.20	10.34	562.
	48.	19.77953	.1976	.0002	823.9	1021.6	58.112	6.20	10.34	574.
	50.	20.60580	.2059	.0002	836.3	1042.3	58.534	6.21	10.35	586.
	55.	22.67099	.2266	.0002	867.4	1094.1	59.521	6.23	10.37	614.
	60.	24.73564	.2472	.0002	898.6	1146.0	60.425	6.27	10.40	641.
	65.	26.79987	.2679	.0002	930.1	1198.1	61.258	6.31	10.45	666.
	70.	28.86380	.2886	.0001	961.8	1250.5	62.035	6.38	10.51	689.
	75.	30.92747	.3092	.0001	994.0	1303.2	62.763	6.46	10.59	712.
	80.	32.99095	.3299	.0001	1026.5	1356.4	63.449	6.56	10.69	733.
	90.	37.11746	.3711	.0001	1093.3	1464.5	64.722	6.80	10.92	772.
	100.	41.24353	.4124	.0001	1162.6	1575.0	65.886	7.07	11.20	808.
	110.	45.36928	.4537	.0001	1234.7	1688.4	66.963	7.35	11.49	841.
	120.	49.49480	.4950	.0001	1309.8	1804.8	67.976	7.66	11.78	873.
	140.	57.74534	.5775	.0001	1468.7	2046.2	69.836	8.22	12.34	931.
	160.	65.99544	.6600	.0001	1638.0	2298.0	71.516	8.70	12.82	986.
	180.	74.24525	.7425	.0001	1816.0	2558.4	73.049	9.09	13.21	1039.
	200.	82.49487	.8250	.0001	2001.0	2826.0	74.459	9.40	13.53	1089.
	220.	90.74435	.9075	.0000	2191.7	3099.1	75.760	9.65	13.78	1138.
	240.	98.99373	.9900	.0000	2386.7	3376.7	76.968	9.85	13.97	1185.
	260.	107.24303	1.0725	.0000	2585.2	3657.6	78.093	9.99	14.12	1231.
	280.	115.49227	1.1550	.0000	2786.3	3941.2	79.143	10.10	14.23	1275.
	300.	123.73215	1.2374	.0000	2989.2	4226.6	80.127	10.18	14.31	1319.
	350.	144.35340	1.4436	.0000	3501.8	4945.3	82.343	10.30	14.42	1422.
	400.	164.97452	1.6498	.0000	4018.3	5668.0	84.273	10.35	14.47	1519.
	450.	185.59556	1.8560	.0000	4536.5	6392.5	85.980	10.37	14.49	1611.
	500.	206.21654	2.0622	.0000	5055.6	7117.8	87.507	10.39	14.51	1697.
	550.	226.83749	2.2685	.0000	5575.3	7843.7	88.891	10.40	14.53	1780.
	600.	247.45841	2.4747	.0000	6096.1	8570.7	90.153	10.42	14.55	1858.
	650.	268.07931	2.6809	.0000	6617.7	9298.5	91.315	10.45	14.57	1934.
	700.	288.70020	2.8871	.0000	7141.0	10028.0	92.403	10.48	14.60	2006.
	750.	309.32108	3.0933	.0000	7666.2	10759.4	93.414	10.52	14.64	2075.
	800.	329.94195	3.2995	.0000	8193.5	11492.9	94.361	10.57	14.69	2142.
	850.	350.56281	3.5057	.0000	8723.7	12229.3	95.253	10.63	14.75	2206.
	900.	371.18367	3.7119	.0000	9256.9	12968.7	96.097	10.70	14.82	2268.
	950.	391.80453	3.9181	.0000	9793.5	13711.6	96.899	10.77	14.90	2328.
	1000.	412.42538	4.1243	.0000	10334.0	14458.2	97.664	10.86	14.98	2386.
	1100.	453.66709	4.5368	.0000	11429.4	15966.0	99.091	11.04	15.16	2496.
	1200.	494.90891	4.9492	.0000	12544.2	17493.3	100.412	11.24	15.36	2601.
	1300.	536.15138	5.3616	.0000	13680.1	19041.6	101.651	11.46	15.58	2700.
	1400.	577.39658	5.7740	.0000	14838.4	20612.3	102.822	11.70	15.82	2795.
	1500.	618.65110	6.1864	.0000	16021.4	22207.9	103.937	11.97	16.10	2884.
	1600.	659.93251	6.5988	.0000	17233.3	23832.7	104.978	12.30	16.44	2969.
	1700.	701.28140	7.0113	.0000	18485.8	25498.6	105.984	12.78	16.94	3048.
	1800.	742.78144	7.4237	.0000	19799.6	27227.4	106.971	13.52	17.71	3119.
	2000.	826.97486	8.2485	.0000	22778.4	31048.1	108.991	16.56	20.99	3232.
	2200.	915.44934	9.0733	.0000	26764.6	35919.1	111.299	23.70	28.81	3319.
	2400.	1014.83413	9.8982	.0000	32969.2	43117.5	114.416	38.13	44.99	3415.
	2600.	1137.61448	10.7230	.0000	43400.4	54776.5	119.066	63.23	74.19	3543.
	2800.	1303.75995	11.5478	.0000	60877.2	73914.8	126.142	100.52	120.10	3709.
	3000.	1538.60332	12.3727	.0000	88375.8	103761.9	136.424	145.32	179.51	3904.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.01 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.804	77.0167	618.8	.25650	89.5531	.01031	72.54	254.83	.00053	1.25158	2.2412
14.	76.8435	611.8	.25478	86.8501	.01063	74.54	247.76	.00054	1.25097	2.1617
* 14.430	76.4900	620.0	.25021	85.4586	.01076	78.55	234.09	.00055	1.24972	1.9881
* 14.430	.1714	145.5	.06684	.0098	.07279	12.74	7.74	.02526	1.00052	.6435
15.	.1646	151.5	.06684	.0098	.06968	13.01	8.07	.02696	1.00050	.6547
16.	.1539	162.1	.06684	.0098	.06488	13.47	8.64	.02997	1.00046	.6745
17.	.1445	172.6	.06683	.0099	.06074	13.91	9.21	.03306	1.00044	.6938
18.	.1363	183.1	.06681	.0099	.05713	14.41	9.77	.03639	1.00041	.7092
19.	.1289	193.6	.06680	.0099	.05394	14.91	10.32	.03987	1.00039	.7231
20.	.1223	204.1	.06679	.0099	.05109	15.53	10.87	.04382	1.00037	.7302
22.	.1110	225.0	.06677	.0099	.04625	17.11	11.95	.05332	1.00033	.7270
24.	.1016	245.9	.06675	.0099	.04226	18.69	13.01	.06376	1.00031	.7227
26.	.0937	266.7	.06674	.0100	.03891	20.28	14.04	.07509	1.00028	.7182
28.	.0869	287.4	.06673	.0100	.03606	21.85	15.04	.08730	1.00026	.7136
30.	.0811	308.2	.06672	.0100	.03361	23.43	16.03	.10041	1.00024	.7087
32.	.0760	328.9	.06672	.0100	.03147	24.82	16.99	.11363	1.00023	.7085
34.	.0715	349.6	.06672	.0100	.02959	26.23	17.93	.12767	1.00022	.7075
36.	.0675	370.4	.06670	.0100	.02793	27.64	18.86	.14254	1.00020	.7058
38.	.0639	391.1	.06669	.0100	.02644	29.04	19.76	.15820	1.00019	.7037
40.	.0607	411.9	.06667	.0100	.02510	30.45	20.65	.17464	1.00018	.7013
42.	.0578	432.6	.06665	.0100	.02390	31.83	21.53	.19178	1.00017	.6990
44.	.0552	453.4	.06662	.0100	.02280	33.21	22.38	.20963	1.00017	.6967
46.	.0528	474.2	.06659	.0100	.02180	34.57	23.22	.22817	1.00016	.6944
48.	.0506	495.1	.06655	.0100	.02089	35.92	24.05	.24734	1.00015	.6923
50.	.0485	516.1	.06649	.0100	.02005	37.25	24.86	.25709	1.00015	.6905
55.	.0441	569.0	.06624	.0100	.01822	40.47	26.84	.31862	1.00013	.6875
60.	.0404	623.0	.06587	.0100	.01669	43.55	28.74	.37298	1.00012	.6862
65.	.0373	678.2	.06535	.0100	.01540	46.73	30.58	.43156	1.00011	.6837
70.	.0346	735.0	.06467	.0100	.01430	49.65	32.36	.49083	1.00010	.6851
75.	.0323	793.7	.06385	.0100	.01334	52.63	34.09	.55322	1.00010	.6861
80.	.0303	854.4	.06291	.0100	.01251	55.18	35.77	.61322	1.00009	.6928
90.	.0269	982.7	.06070	.0100	.01112	61.76	39.01	.75544	1.00008	.6900
100.	.0242	1119.3	.05835	.0100	.01000	67.78	42.10	.89873	1.00007	.6955
110.	.0220	1263.4	.05604	.0100	.00909	76.26	44.74	1.08415	1.00007	.6740
120.	.0202	1413.9	.05387	.0100	.00833	82.86	47.58	1.25287	1.00006	.6766
140.	.0173	1728.1	.05019	.0100	.00714	96.08	53.00	1.61795	1.00005	.6809
160.	.0152	2051.4	.04743	.0100	.00625	109.16	58.14	2.02283	1.00005	.6828
180.	.0135	2378.4	.04539	.0100	.00556	121.88	63.06	2.46548	1.00004	.6836
200.	.0121	2705.4	.04387	.0100	.00500	134.09	67.80	2.94392	1.00004	.6839
220.	.0110	3031.2	.04273	.0100	.00455	145.72	72.38	3.45508	1.00003	.6843
240.	.0101	3353.1	.04189	.0100	.00417	156.78	76.82	3.99933	1.00003	.6846
260.	.0093	3670.9	.04127	.0100	.00385	167.31	81.15	4.57538	1.00003	.6847
280.	.0087	3984.0	.04082	.0100	.00357	177.36	85.36	5.18288	1.00003	.6848
300.	.0081	4292.7	.04050	.0100	.00333	186.98	89.48	5.82079	1.00002	.6847
350.	.0069	5048.8	.04004	.0100	.00286	209.48	99.40	7.54673	1.00002	.6845
400.	.0061	5790.0	.03985	.0100	.00250	230.29	108.86	9.44925	1.00002	.6842
450.	.0054	6522.9	.03977	.0100	.00222	249.93	117.95	11.52072	1.00002	.6840
500.	.0048	7257.1	.03970	.0100	.00200	268.76	126.70	13.74702	1.00001	.6842
550.	.0044	7990.6	.03964	.0100	.00182	287.02	135.18	16.13349	1.00001	.6842
600.	.0040	8728.4	.03957	.0100	.00167	304.90	143.40	18.67226	1.00001	.6842
650.	.0037	9470.6	.03948	.0100	.00154	322.54	151.41	21.36436	1.00001	.6840
700.	.0035	10222.3	.03936	.0100	.00143	340.01	159.23	24.19941	1.00001	.6838
750.	.0032	10982.8	.03921	.0100	.00133	357.41	166.86	27.17932	1.00001	.6837
800.	.0030	11754.6	.03902	.0100	.00125	374.78	174.35	30.29753	1.00001	.6835
850.	.0029	12539.5	.03881	.0100	.00118	392.16	181.68	33.54945	1.00001	.6834
900.	.0027	13338.6	.03856	.0100	.00111	409.59	188.89	36.93071	1.00001	.6835
950.	.0026	14152.9	.03828	.0100	.00105	427.10	195.97	40.43739	1.00001	.6836
1000.	.0024	14983.1	.03798	.0100	.00100	444.68	202.95	44.06624	1.00001	.6838
1100.	.0022	16680.4	.03736	.0100	.00091	475.57	216.59	51.22083	1.00001	.6906
1200.	.0020	18437.5	.03669	.0100	.00083	511.07	229.87	59.25423	1.00001	.6911
1300.	.0019	20257.4	.03600	.0100	.00077	547.21	242.83	67.78122	1.00001	.6915
1400.	.0017	22150.2	.03526	.0100	.00071	584.47	255.49	76.78772	1.00001	.6916
1500.	.0016	24146.2	.03446	.0100	.00067	624.14	267.89	86.35098	1.00000	.6909
1600.	.0015	26303.1	.03352	.0100	.00063	668.83	280.05	96.64986	1.00000	.6884
1700.	.0014	28785.3	.03228	.0100	.00059	724.87	291.98	108.05260	1.00000	.6822
1800.	.0013	31869.2	.03053	.0100	.00056	802.94	303.70	121.20117	1.00000	.6700
2000.	.0012	41867.6	.02497	.0100	.00050	1102.50	326.65	156.38992	1.00000	.6218
2200.	.0011	62819.1	.01756	.0099	.00046	1813.25	345.83	207.42375	1.00000	.5495
2400.	.0010	105323.9	.01109	.0098	.00043	3331.19	369.24	270.48414	1.00000	.4987
2600.	.0009	181821.4	.00692	.0094	.00041	6115.38	394.59	337.57537	1.00000	.4787
2800.	.0008	297845.5	.00463	.0089	.00040	10362.66	421.87	404.98758	1.00000	.4889
3000.	.0006	433048.8	.00353	.0080	.00041	15311.58	447.27	472.46613	1.00000	.5244

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.02 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.807	.01298	1.1634	.9234	218.2	218.5	14.082	4.67	6.38	1260.
	14.	.01301	1.1318	.9234	219.5	219.8	14.173	4.72	6.50	1249.
	15.	.01315	1.0325	.9076	226.2	226.5	14.636	4.92	6.99	1211.
*	15.832	.01329	1.0154	.8919	232.2	232.5	15.026	5.09	7.28	1205.
*	15.832	3.15931	.0610	.0013	622.2	685.4	43.633	6.27	10.81	325.
	16.	3.19578	.0618	.0013	623.3	687.2	43.747	6.26	10.80	326.
	17.	3.41127	.0663	.0012	629.7	697.9	44.399	6.24	10.71	337.
	18.	3.62529	.0708	.0011	636.1	708.6	45.009	6.23	10.54	348.
	19.	3.83822	.0752	.0011	642.4	719.2	45.583	6.22	10.59	358.
	20.	4.05030	.0795	.0010	648.8	729.8	46.126	6.21	10.56	368.
	22.	4.47250	.0882	.0009	661.4	750.8	47.131	6.21	10.51	386.
	24.	4.89279	.0967	.0008	674.0	771.8	48.044	6.20	10.47	404.
	26.	5.31167	.1052	.0008	686.5	792.7	48.879	6.20	10.44	421.
	28.	5.72950	.1137	.0007	699.0	813.6	49.652	6.20	10.42	437.
	30.	6.14651	.1221	.0007	711.5	834.4	50.371	6.20	10.41	453.
	32.	6.56286	.1305	.0006	724.0	855.2	51.042	6.20	10.39	468.
	34.	6.97869	.1389	.0006	736.4	876.0	51.672	6.19	10.38	483.
	36.	7.39410	.1473	.0006	748.9	896.8	52.265	6.19	10.37	497.
	38.	7.80915	.1556	.0005	761.3	917.5	52.826	6.19	10.37	510.
	40.	8.22390	.1640	.0005	773.8	938.2	53.358	6.20	10.36	524.
	42.	8.63841	.1723	.0005	786.2	959.0	53.863	6.20	10.36	537.
	44.	9.05271	.1806	.0005	798.6	979.7	54.345	6.20	10.36	549.
	46.	9.46683	.1889	.0004	811.1	1000.4	54.805	6.20	10.36	562.
	48.	9.88078	.1973	.0004	823.5	1021.1	55.246	6.20	10.36	574.
	50.	10.29461	.2056	.0004	835.9	1041.8	55.669	6.21	10.36	586.
	55.	11.32868	.2263	.0004	867.1	1093.7	56.657	6.23	10.38	614.
	60.	12.36221	.2470	.0003	898.4	1145.6	57.562	6.27	10.41	641.
	65.	13.39533	.2677	.0003	929.9	1197.8	58.395	6.32	10.45	666.
	70.	14.42813	.2884	.0003	961.6	1250.2	59.173	6.38	10.52	689.
	75.	15.46069	.3091	.0003	993.8	1303.0	59.901	6.46	10.60	712.
	80.	16.49305	.3298	.0003	1026.4	1356.2	60.588	6.56	10.69	733.
	90.	18.55732	.3711	.0002	1093.1	1464.3	61.862	6.80	10.93	772.
	100.	20.62115	.4124	.0002	1162.5	1574.9	63.026	7.07	11.20	808.
	110.	22.68466	.4537	.0002	1234.6	1688.3	64.103	7.36	11.49	841.
	120.	24.74793	.4950	.0002	1309.7	1804.7	65.117	7.66	11.79	873.
	140.	28.87400	.5775	.0001	1468.6	2046.1	66.977	8.22	12.35	931.
	160.	32.99962	.6601	.0001	1637.9	2297.9	68.656	8.70	12.82	987.
	180.	37.12496	.7426	.0001	1815.9	2558.4	70.190	9.09	13.21	1039.
	200.	41.25010	.8251	.0001	2001.0	2826.0	71.600	9.40	13.53	1090.
	220.	45.37510	.9076	.0001	2191.6	3099.1	72.901	9.65	13.78	1138.
	240.	49.50000	.9901	.0001	2386.7	3376.7	74.109	9.85	13.97	1185.
	260.	53.62482	1.0726	.0001	2585.2	3657.7	75.234	9.99	14.12	1231.
	280.	57.74958	1.1551	.0001	2786.2	3941.2	76.284	10.10	14.23	1275.
	300.	61.86966	1.2375	.0001	2989.2	4226.6	77.268	10.18	14.31	1319.
	350.	72.18050	1.4438	.0001	3501.8	4945.4	79.484	10.30	14.42	1422.
	400.	82.49121	1.6500	.0001	4018.2	5668.1	81.415	10.35	14.47	1519.
	450.	92.80183	1.8562	.0000	4536.5	6392.6	83.121	10.37	14.49	1611.
	500.	103.11240	2.0624	.0000	5055.6	7117.8	84.648	10.39	14.51	1697.
	550.	113.42293	2.2686	.0000	5575.3	7843.8	86.033	10.40	14.53	1780.
	600.	123.73343	2.4748	.0000	6096.1	8570.8	87.295	10.42	14.55	1859.
	650.	134.04392	2.6810	.0000	6617.7	9298.6	88.456	10.45	14.57	1934.
	700.	144.35440	2.8873	.0000	7141.0	10028.1	89.544	10.48	14.60	2006.
	750.	154.66486	3.0935	.0000	7666.2	10759.5	90.555	10.52	14.64	2075.
	800.	164.97531	3.2997	.0000	8193.5	11493.0	91.502	10.57	14.69	2142.
	850.	175.28576	3.5059	.0000	8723.7	12229.4	92.394	10.63	14.75	2206.
	900.	185.59621	3.7121	.0000	9256.9	12968.8	93.238	10.70	14.82	2268.
	950.	195.90665	3.9183	.0000	9793.5	13711.6	94.040	10.77	14.90	2328.
	1000.	206.21708	4.1245	.0000	10333.9	14458.3	94.806	10.86	14.98	2386.
	1100.	226.83795	4.5369	.0000	11429.4	15966.1	96.232	11.04	15.16	2496.
	1200.	247.45886	4.9494	.0000	12544.2	17493.4	97.553	11.24	15.36	2601.
	1300.	268.07999	5.3618	.0000	13680.0	19041.6	98.792	11.46	15.58	2700.
	1400.	288.70208	5.7742	.0000	14837.9	20611.9	99.963	11.69	15.81	2795.
	1500.	309.32747	6.1866	.0000	16019.6	22206.2	101.077	11.95	16.08	2885.
	1600.	329.96236	6.5990	.0000	17227.8	23827.1	102.116	12.25	16.38	2971.
	1700.	350.62111	7.0114	.0000	18470.9	25483.4	103.115	12.65	16.79	3051.
	1800.	371.33330	7.4239	.0000	19763.5	27190.1	104.090	13.22	17.40	3125.
	2000.	413.17959	8.2487	.0000	22614.2	30877.7	106.041	15.49	19.82	3249.
	2200.	456.53955	9.0735	.0000	26196.3	35327.1	108.150	20.64	25.45	3343.
	2400.	503.75825	9.8984	.0000	31366.4	41441.5	110.797	30.99	37.00	3435.
	2600.	559.26734	10.7232	.0000	39549.8	50735.2	114.506	49.12	57.82	3549.
	2800.	630.28760	11.5480	.0000	52797.1	65402.8	119.931	76.83	91.15	3697.
	3000.	726.79296	12.3729	.0000	73552.5	88088.4	127.747	113.04	137.57	3875.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.02 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 13.807	77.0224	619.1	.25649	89.6087	.01031	72.58	254.89	.00053	1.25160	2.2405
14.	76.8522	612.4	.25479	86.9799	.01062	74.55	247.94	.00054	1.25100	2.1622
15.	76.0247	604.6	.24263	78.4985	.01156	83.06	218.31	.00056	1.24809	1.8373
* 15.832	75.2560	623.4	.23300	76.4147	.01167	88.05	197.78	.00058	1.24539	1.6345
* 15.832	.3165	157.7	.06680	.0193	.06860	13.58	8.58	.01428	1.00095	.6831
16.	.3129	159.4	.06682	.0193	.06771	13.65	8.67	.01454	1.00094	.6860
17.	.2931	170.1	.06687	.0194	.06293	14.06	9.24	.01613	1.00088	.7032
18.	.2758	180.8	.06689	.0195	.05887	14.54	9.80	.01783	1.00083	.7171
19.	.2605	191.4	.06689	.0196	.05535	15.02	10.35	.01959	1.00079	.7300
20.	.2469	202.0	.06689	.0196	.05227	15.63	10.90	.02158	1.00074	.7362
22.	.2236	223.2	.06686	.0197	.04708	17.19	11.98	.02635	1.00067	.7317
24.	.2044	244.2	.06684	.0198	.04287	18.77	13.03	.03158	1.00062	.7266
26.	.1883	265.2	.06682	.0198	.03938	20.35	14.06	.03726	1.00057	.7215
28.	.1745	286.2	.06680	.0198	.03642	21.91	15.06	.04337	1.00053	.7164
30.	.1627	307.0	.06679	.0199	.03389	23.48	16.05	.04993	1.00049	.7111
32.	.1524	327.9	.06678	.0199	.03170	24.88	17.01	.05656	1.00046	.7106
34.	.1433	348.7	.06677	.0199	.02978	26.28	17.95	.06359	1.00043	.7093
36.	.1352	369.5	.06675	.0199	.02808	27.69	18.88	.07104	1.00041	.7073
38.	.1281	390.3	.06674	.0199	.02656	29.09	19.78	.07888	1.00039	.7050
40.	.1216	411.1	.06671	.0199	.02521	30.49	20.67	.08711	1.00037	.7024
42.	.1158	431.9	.06669	.0199	.02398	31.88	21.54	.09569	1.00035	.7000
44.	.1105	452.8	.06666	.0200	.02288	33.25	22.40	.10463	1.00033	.6976
46.	.1056	473.6	.06663	.0200	.02187	34.62	23.24	.11391	1.00032	.6952
48.	.1012	494.5	.06658	.0200	.02094	35.96	24.06	.12350	1.00030	.6930
50.	.0971	515.6	.06652	.0200	.02010	37.29	24.87	.13339	1.00029	.6911
55.	.0883	568.6	.06627	.0200	.01825	40.50	26.85	.15917	1.00027	.6880
60.	.0809	622.6	.06590	.0200	.01672	43.58	28.75	.18637	1.00024	.6866
65.	.0747	677.9	.06538	.0200	.01542	46.76	30.59	.21568	1.00022	.6840
70.	.0693	734.8	.06470	.0200	.01431	49.68	32.37	.24534	1.00021	.6854
75.	.0647	793.5	.06387	.0200	.01336	52.65	34.10	.27654	1.00019	.6863
80.	.0606	854.2	.06293	.0200	.01252	55.21	35.78	.30656	1.00018	.6930
90.	.0539	982.6	.06072	.0200	.01112	61.79	39.02	.37770	1.00016	.6901
100.	.0485	1119.2	.05837	.0200	.01001	67.80	42.10	.44937	1.00015	.6956
110.	.0441	1263.3	.05605	.0200	.00910	76.27	44.74	.54202	1.00013	.6741
120.	.0404	1413.9	.05388	.0200	.00834	82.87	47.58	.62640	1.00012	.6767
140.	.0346	1728.1	.05020	.0200	.00714	96.08	53.00	.80897	1.00010	.6810
160.	.0303	2051.4	.04744	.0200	.00625	109.17	58.14	1.01144	1.00009	.6829
180.	.0269	2378.5	.04539	.0200	.00556	121.89	63.06	1.23279	1.00008	.6837
200.	.0242	2705.5	.04388	.0200	.00500	134.09	67.80	1.47203	1.00007	.6840
220.	.0220	3031.4	.04274	.0200	.00455	145.72	72.38	1.72763	1.00007	.6844
240.	.0202	3353.3	.04190	.0200	.00417	156.78	76.82	1.99978	1.00006	.6846
260.	.0186	3671.1	.04128	.0200	.00385	167.31	81.15	2.28782	1.00006	.6847
280.	.0173	3984.3	.04083	.0200	.00357	177.36	85.36	2.59158	1.00005	.6848
300.	.0162	4292.9	.04050	.0200	.00333	186.98	89.48	2.91056	1.00005	.6847
350.	.0139	5049.0	.04005	.0200	.00286	209.48	99.40	3.77357	1.00004	.6845
400.	.0121	5790.2	.03985	.0200	.00250	230.29	108.86	4.72486	1.00004	.6842
450.	.0108	6523.2	.03977	.0200	.00222	249.93	117.95	5.76062	1.00003	.6840
500.	.0097	7257.4	.03970	.0200	.00200	268.76	126.70	6.87380	1.00003	.6842
550.	.0088	7990.9	.03964	.0200	.00182	287.02	135.18	8.06707	1.00003	.6842
600.	.0081	8728.7	.03957	.0200	.00167	304.91	143.40	9.33647	1.00002	.6842
650.	.0075	9470.9	.03949	.0200	.00154	322.54	151.41	10.68255	1.00002	.6840
700.	.0069	10222.6	.03936	.0200	.00143	340.01	159.23	12.10009	1.00002	.6838
750.	.0065	10983.1	.03921	.0200	.00133	357.41	166.87	13.59007	1.00002	.6837
800.	.0061	11754.9	.03902	.0200	.00125	374.78	174.35	15.14920	1.00002	.6835
850.	.0057	12539.8	.03881	.0200	.00118	392.17	181.68	16.77518	1.00002	.6834
900.	.0054	13338.9	.03856	.0200	.00111	409.60	188.89	18.46583	1.00002	.6834
950.	.0051	14153.3	.03828	.0200	.00105	427.10	195.97	20.21919	1.00002	.6836
1000.	.0048	14983.4	.03798	.0200	.00100	444.68	202.95	22.03364	1.00001	.6838
1100.	.0044	16680.7	.03736	.0200	.00091	475.56	216.59	25.61085	1.00001	.6906
1200.	.0040	18437.3	.03669	.0200	.00083	511.05	229.87	29.63228	1.00001	.6911
1300.	.0037	20255.3	.03600	.0200	.00077	547.11	242.83	33.88915	1.00001	.6915
1400.	.0035	22140.8	.03528	.0200	.00071	584.08	255.49	38.38558	1.00001	.6918
1500.	.0032	24113.7	.03452	.0200	.00067	622.83	267.89	43.14408	1.00001	.6915
1600.	.0030	26208.2	.03368	.0200	.00063	665.06	280.05	48.22769	1.00001	.6898
1700.	.0029	28541.8	.03262	.0200	.00059	715.29	291.98	53.76844	1.00001	.6854
1800.	.0027	31308.9	.03120	.0200	.00056	781.06	303.69	60.00541	1.00001	.6766
2000.	.0024	39572.9	.02668	.0200	.00050	1013.92	326.58	76.08398	1.00001	.6385
2200.	.0022	55645.3	.02011	.0199	.00046	1538.81	345.56	99.35360	1.00001	.5716
2400.	.0020	87229.9	.01354	.0196	.00042	2643.93	368.40	129.60785	1.00001	.5155
2600.	.0018	144123.4	.00876	.0192	.00040	4691.96	392.72	163.37657	1.00001	.4840
2800.	.0016	233801.7	.00586	.0183	.00039	7955.96	419.23	198.05372	1.00000	.4803
3000.	.0014	351285.0	.00429	.0170	.00039	12245.90	446.53	232.91357	1.00000	.5016

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.04 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.814	.01298	1.1647	.9237	218.2	218.8	14.082	4.68	6.38	1261.
14.	.01301	1.1349	.9236	219.5	220.0	14.171	4.72	6.50	1250.
15.	.01315	1.0346	.9083	226.2	226.7	14.633	4.92	6.99	1212.
16.	.01331	.9689	.8905	233.4	233.9	15.099	5.12	7.44	1187.
17.	.01348	.9053	.8754	241.1	241.6	15.566	5.30	7.92	1163.
* 17.497	.01357	.8806	.8682	245.1	245.6	15.799	5.39	8.15	1154.
* 17.497	1.71035	.0646	.0025	630.1	698.5	41.681	6.34	11.20	338.
18.	1.76648	.0670	.0024	633.4	704.1	41.997	6.32	11.10	343.
19.	1.87705	.0718	.0022	640.0	715.1	42.593	6.28	10.96	354.
20.	1.98652	.0764	.0021	646.6	726.0	43.153	6.26	10.86	364.
22.	2.20310	.0855	.0019	659.5	747.6	44.184	6.24	10.73	384.
24.	2.41749	.0944	.0017	672.3	769.0	45.114	6.22	10.64	402.
26.	2.63035	.1032	.0016	685.0	790.2	45.961	6.22	10.58	419.
28.	2.84208	.1119	.0015	697.6	811.3	46.743	6.21	10.54	436.
30.	3.05295	.1205	.0014	710.2	832.4	47.469	6.21	10.51	452.
32.	3.26314	.1291	.0013	722.8	853.3	48.146	6.21	10.48	467.
34.	3.47278	.1376	.0012	735.3	874.3	48.781	6.20	10.46	482.
36.	3.68199	.1461	.0011	747.9	895.2	49.379	6.20	10.44	496.
38.	3.89084	.1545	.0011	760.4	916.0	49.943	6.20	10.42	510.
40.	4.09939	.1630	.0010	772.9	936.9	50.477	6.20	10.41	523.
42.	4.30768	.1714	.0010	785.4	957.7	50.985	6.20	10.40	536.
44.	4.51576	.1798	.0009	797.9	978.5	51.468	6.20	10.40	549.
46.	4.72366	.1882	.0009	810.3	999.3	51.930	6.20	10.39	561.
48.	4.93140	.1965	.0008	822.8	1020.1	52.373	6.21	10.39	574.
50.	5.13901	.2049	.0008	835.3	1040.8	52.797	6.21	10.39	585.
55.	5.65753	.2258	.0007	866.5	1092.8	53.788	6.23	10.40	614.
60.	6.17550	.2466	.0007	897.8	1144.9	54.694	6.27	10.43	640.
65.	6.69306	.2674	.0006	929.4	1197.1	55.529	6.32	10.47	666.
70.	7.21030	.2881	.0006	961.2	1249.6	56.308	6.38	10.53	689.
75.	7.72730	.3088	.0005	993.4	1302.5	57.037	6.46	10.61	712.
80.	8.24410	.3296	.0005	1026.0	1355.7	57.725	6.56	10.70	733.
90.	9.27725	.3710	.0004	1092.8	1463.9	58.999	6.80	10.94	773.
100.	10.30996	.4123	.0004	1162.2	1574.6	60.165	7.07	11.21	808.
110.	11.34235	.4537	.0004	1234.3	1688.0	61.242	7.36	11.50	842.
120.	12.37451	.4950	.0003	1309.5	1804.4	62.256	7.66	11.79	873.
140.	14.43833	.5776	.0003	1468.4	2046.0	64.117	8.22	12.35	932.
160.	16.50171	.6602	.0003	1637.8	2297.9	65.796	8.70	12.82	987.
180.	18.56481	.7428	.0002	1815.8	2558.4	67.331	9.09	13.22	1039.
200.	20.62771	.8253	.0002	2000.8	2826.0	68.740	9.40	13.53	1090.
220.	22.69048	.9079	.0002	2191.5	3099.1	70.042	9.65	13.78	1138.
240.	24.75314	.9904	.0002	2386.6	3376.7	71.250	9.85	13.97	1185.
260.	26.81572	1.0729	.0002	2585.1	3657.7	72.375	9.99	14.12	1231.
280.	28.87824	1.1554	.0001	2786.2	3941.3	73.425	10.10	14.23	1276.
300.	30.93842	1.2378	.0001	2989.2	4226.7	74.409	10.18	14.31	1319.
350.	36.09405	1.4441	.0001	3501.7	4945.5	76.626	10.30	14.43	1422.
400.	41.24955	1.6503	.0001	4018.2	5668.2	78.556	10.35	14.47	1519.
450.	46.40496	1.8565	.0001	4536.5	6392.7	80.262	10.37	14.50	1611.
500.	51.56032	2.0627	.0001	5055.6	7118.0	81.790	10.39	14.51	1698.
550.	56.71565	2.2690	.0001	5575.3	7843.9	83.174	10.40	14.53	1780.
600.	61.87095	2.4752	.0001	6096.1	8570.9	84.436	10.42	14.55	1859.
650.	67.02623	2.6814	.0001	6617.7	9298.8	85.598	10.45	14.57	1934.
700.	72.18149	2.8876	.0001	7141.0	10028.2	86.686	10.48	14.60	2006.
750.	77.33675	3.0938	.0001	7666.2	10759.7	87.696	10.52	14.64	2075.
800.	82.49200	3.3000	.0001	8193.5	11493.2	88.643	10.57	14.69	2142.
850.	87.64724	3.5062	.0000	8723.6	12229.5	89.536	10.63	14.75	2206.
900.	92.80248	3.7124	.0000	9256.9	12969.0	90.380	10.70	14.82	2268.
950.	97.95771	3.9187	.0000	9793.5	13711.8	91.182	10.77	14.90	2328.
1000.	103.11294	4.1249	.0000	10333.9	14458.5	91.947	10.86	14.98	2386.
1100.	113.42339	4.5373	.0000	11429.4	15966.3	93.373	11.04	15.16	2496.
1200.	123.73385	4.9497	.0000	12544.2	17493.6	94.695	11.24	15.36	2601.
1300.	134.04438	5.3621	.0000	13679.9	19041.7	95.933	11.45	15.58	2700.
1400.	144.35526	5.7745	.0000	14837.5	20611.7	97.104	11.68	15.81	2795.
1500.	154.66729	6.1870	.0000	16018.4	22205.1	98.217	11.93	16.06	2885.
1600.	164.98269	6.5994	.0000	17223.9	23823.3	99.254	12.21	16.34	2972.
1700.	175.30652	7.0118	.0000	18460.4	25472.7	100.250	12.55	16.69	3054.
1800.	185.64924	7.4242	.0000	19737.9	27163.9	101.215	13.02	17.18	3130.
2000.	206.48386	8.2490	.0000	22498.0	30757.4	103.118	14.72	19.00	3262.
2200.	227.85367	9.0739	.0000	25794.5	34908.6	105.085	18.47	23.08	3366.
2400.	250.58802	9.8987	.0000	30232.6	40256.2	107.401	25.91	31.33	3457.
2600.	276.25686	10.7235	.0000	36821.5	47871.8	110.441	38.95	46.17	3562.
2800.	307.44190	11.5484	.0000	47030.5	59328.2	114.681	59.21	70.10	3693.
3000.	347.85821	12.3732	.0000	62713.5	76627.9	120.644	86.94	104.62	3853.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.04 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.814	77.0340	619.8	.25646	89.7200	.01029	72.67	255.02	.00053	1.25164	2.2391
14.	76.8696	613.6	.25483	87.2391	.01059	74.57	248.30	.00054	1.25106	2.1631
15.	76.0433	605.3	.24280	78.6773	.01154	83.08	218.62	.00056	1.24816	1.8387
16.	75.1384	608.0	.23158	72.8003	.01223	88.93	194.63	.00057	1.24498	1.6276
17.	74.1849	607.4	.22254	67.1585	.01304	92.75	175.22	.00057	1.24164	1.4958
* 17.497	73.6915	608.9	.21861	64.8893	.01338	94.24	166.89	.00057	1.23991	1.4428
* 17.497	.5847	170.9	.06672	.0378	.06552	14.63	9.58	.00805	1.00176	.7329
18.	.5661	176.3	.06682	.0379	.06297	14.84	9.86	.00850	1.00171	.7373
19.	.5328	187.1	.06694	.0382	.05858	15.28	10.41	.00942	1.00161	.7466
20.	.5034	197.9	.06700	.0385	.05487	15.86	10.95	.01044	1.00152	.7503
22.	.4539	219.5	.06702	.0388	.04887	17.38	12.03	.01285	1.00137	.7422
24.	.4137	241.0	.06700	.0391	.04416	18.93	13.07	.01548	1.00125	.7350
26.	.3802	262.4	.06697	.0392	.04034	20.49	14.10	.01833	1.00115	.7283
28.	.3519	283.6	.06694	.0394	.03717	22.04	15.10	.02140	1.00106	.7222
30.	.3276	304.7	.06691	.0395	.03447	23.60	16.09	.02469	1.00099	.7162
32.	.3065	325.8	.06689	.0396	.03216	24.99	17.05	.02802	1.00092	.7148
34.	.2880	346.8	.06687	.0396	.03015	26.39	17.99	.03155	1.00087	.7128
36.	.2716	367.8	.06685	.0397	.02838	27.79	18.91	.03529	1.00082	.7103
38.	.2570	388.7	.06683	.0397	.02682	29.19	19.81	.03922	1.00077	.7076
40.	.2439	409.7	.06680	.0398	.02542	30.59	20.70	.04335	1.00074	.7047
42.	.2321	430.6	.06678	.0398	.02416	31.97	21.57	.04765	1.00070	.7020
44.	.2214	451.5	.06675	.0398	.02303	33.34	22.42	.05213	1.00067	.6993
46.	.2117	472.5	.06671	.0398	.02200	34.70	23.26	.05677	1.00064	.6968
48.	.2028	493.5	.06666	.0399	.02106	36.04	24.09	.06158	1.00061	.6944
50.	.1946	514.6	.06659	.0399	.02019	37.37	24.90	.06653	1.00059	.6924
55.	.1768	567.8	.06634	.0399	.01832	40.57	26.87	.07945	1.00053	.6889
60.	.1619	621.9	.06596	.0399	.01677	43.65	28.78	.09307	1.00049	.6874
65.	.1494	677.3	.06543	.0399	.01546	46.82	30.61	.10774	1.00045	.6846
70.	.1387	734.2	.06475	.0400	.01434	49.74	32.39	.12259	1.00042	.6859
75.	.1294	793.0	.06392	.0400	.01338	52.71	34.12	.13820	1.00039	.6868
80.	.1213	853.8	.06297	.0400	.01253	55.26	35.80	.15323	1.00037	.6934
90.	.1078	982.3	.06076	.0400	.01113	61.83	39.03	.18883	1.00032	.6903
100.	.0970	1119.0	.05840	.0400	.01001	67.84	42.12	.22469	1.00029	.6957
110.	.0882	1263.2	.05608	.0400	.00910	76.28	44.74	.27095	1.00027	.6743
120.	.0808	1413.8	.05390	.0400	.00834	82.89	47.58	.31316	1.00024	.6769
140.	.0693	1728.1	.05022	.0400	.00715	96.10	53.00	.40448	1.00021	.6811
160.	.0606	2051.5	.04746	.0400	.00625	109.18	58.14	.50574	1.00018	.6829
180.	.0539	2378.7	.04541	.0400	.00556	121.90	63.06	.61644	1.00016	.6837
200.	.0485	2705.8	.04389	.0400	.00500	134.10	67.80	.73608	1.00015	.6840
220.	.0441	3031.7	.04275	.0400	.00455	145.73	72.38	.86390	1.00013	.6844
240.	.0404	3353.6	.04191	.0400	.00417	156.79	76.82	.99999	1.00012	.6846
260.	.0373	3671.4	.04129	.0400	.00385	167.32	81.15	1.14403	1.00011	.6847
280.	.0346	3984.7	.04084	.0400	.00357	177.37	85.36	1.29593	1.00010	.6848
300.	.0323	4293.4	.04051	.0400	.00333	186.99	89.48	1.45544	1.00010	.6848
350.	.0277	5049.5	.04005	.0400	.00286	209.48	99.40	1.88698	1.00008	.6845
400.	.0242	5790.7	.03986	.0400	.00250	230.30	108.86	2.35265	1.00007	.6842
450.	.0215	6523.7	.03978	.0400	.00222	249.94	117.95	2.88057	1.00006	.6840
500.	.0194	7258.0	.03970	.0400	.00200	268.76	126.70	3.43718	1.00006	.6842
550.	.0176	7991.5	.03965	.0400	.00182	287.03	135.18	4.03384	1.00005	.6842
600.	.0162	8729.3	.03958	.0400	.00167	304.91	143.40	4.66857	1.00005	.6842
650.	.0149	9471.5	.03949	.0400	.00154	322.54	151.41	5.34163	1.00004	.6840
700.	.0139	10223.2	.03936	.0400	.00143	340.02	159.23	6.05043	1.00004	.6838
750.	.0129	10983.7	.03921	.0400	.00133	357.41	166.87	6.79544	1.00004	.6837
800.	.0121	11755.5	.03903	.0400	.00125	374.78	174.35	7.57502	1.00004	.6835
850.	.0114	12540.4	.03881	.0400	.00118	392.17	181.68	8.38803	1.00003	.6834
900.	.0108	13339.5	.03856	.0400	.00111	409.60	188.89	9.23338	1.00003	.6834
950.	.0102	14153.9	.03829	.0400	.00105	427.10	195.97	10.11008	1.00003	.6836
1000.	.0097	14984.0	.03798	.0400	.00100	444.69	202.95	11.01732	1.00003	.6838
1100.	.0088	16681.2	.03736	.0400	.00091	475.56	216.59	12.80589	1.00003	.6906
1200.	.0081	18437.7	.03670	.0400	.00083	511.03	229.87	14.81653	1.00002	.6911
1300.	.0075	20254.3	.03601	.0400	.00077	547.84	242.83	16.94442	1.00002	.6915
1400.	.0069	22134.7	.03530	.0400	.00071	583.80	255.49	19.19024	1.00002	.6919
1500.	.0065	24091.2	.03456	.0400	.00067	621.90	267.89	21.56130	1.00002	.6918
1600.	.0061	26141.5	.03379	.0400	.00062	662.39	280.05	24.07967	1.00002	.6908
1700.	.0057	28370.1	.03287	.0400	.00059	708.51	291.97	26.79214	1.00002	.6878
1800.	.0054	30913.0	.03169	.0400	.00056	765.58	303.68	29.73615	1.00002	.6814
2000.	.0048	37948.7	.02805	.0400	.00050	951.20	326.53	37.21792	1.00001	.6522
2200.	.0044	50549.9	.02242	.0398	.00046	1343.85	345.36	47.76273	1.00001	.5931
2400.	.0040	74262.6	.01612	.0395	.00042	2151.31	367.77	61.93917	1.00001	.5356
2600.	.0036	116504.2	.01091	.0388	.00040	3648.79	391.22	78.58900	1.00001	.4951
2800.	.0033	184316.4	.00742	.0376	.00038	6095.60	416.61	96.24413	1.00001	.4791
3000.	.0029	279107.0	.00533	.0356	.00037	9541.08	443.87	114.20189	1.00001	.4867

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.06 MPA ISOBAR

	TEMPERATURE	VOLUME	ISOTHERM DERIVATIVE	ISOCHORE DERIVATIVE	INTERNAL ENERGY	ENTHALPY	ENTROPY	CV	CP	VELOCITY OF SOUND
	K	CU M/KG	CU M-MPA/KG	MPA/K	KJ/KG-K	KJ/KG	KJ/KG-K	KJ / KG-K		M/S
*	13.821	.01298	1.1660	.9239	218.2	219.0	14.083	4.68	6.38	1261.
	14.	.01301	1.1380	.9239	219.4	220.2	14.168	4.71	6.49	1252.
	15.	.01315	1.0367	.9090	226.1	226.9	14.630	4.92	6.99	1213.
	16.	.01331	.9709	.8912	233.3	234.1	15.096	5.12	7.43	1188.
	17.	.01348	.9073	.8761	241.0	241.8	15.562	5.30	7.91	1164.
	18.	.01366	.8460	.8616	249.2	250.0	16.030	5.47	8.42	1141.
*	18.621	.01378	.8147	.8524	254.5	255.3	16.321	5.56	8.72	1130.
*	18.621	1.19270	.0663	.0036	634.8	706.3	40.545	6.41	11.53	345.
	19.	1.22174	.0682	.0035	637.4	710.7	40.777	6.38	11.43	350.
	20.	1.29743	.0732	.0033	644.2	722.0	41.358	6.33	11.23	360.
	22.	1.44595	.0828	.0029	657.5	744.2	42.418	6.27	10.98	381.
	24.	1.59196	.0921	.0026	670.5	766.0	43.367	6.25	10.83	400.
	26.	1.73629	.1011	.0024	683.4	787.6	44.228	6.23	10.73	417.
	28.	1.87941	.1101	.0022	696.2	809.0	45.020	6.23	10.66	434.
	30.	2.02162	.1189	.0021	709.0	830.2	45.754	6.22	10.61	450.
	32.	2.16313	.1276	.0019	721.6	851.4	46.437	6.22	10.57	466.
	34.	2.30408	.1363	.0018	734.3	872.5	47.077	6.21	10.53	481.
	36.	2.44457	.1449	.0017	746.9	893.5	47.678	6.21	10.50	495.
	38.	2.58470	.1534	.0016	759.5	914.5	48.246	6.21	10.48	509.
	40.	2.72452	.1620	.0015	772.0	935.5	48.783	6.21	10.46	523.
	42.	2.86409	.1705	.0014	784.6	956.4	49.293	6.21	10.45	536.
	44.	3.00344	.1789	.0014	797.1	977.3	49.779	6.21	10.44	549.
	46.	3.14260	.1874	.0013	809.6	998.2	50.242	6.21	10.43	561.
	48.	3.28161	.1958	.0013	822.1	1019.0	50.686	6.21	10.42	573.
	50.	3.42047	.2042	.0012	834.6	1039.8	51.111	6.22	10.42	585.
	55.	3.76715	.2252	.0011	865.9	1091.9	52.105	6.24	10.42	614.
	60.	4.11327	.2461	.0010	897.3	1144.1	53.013	6.27	10.45	640.
	65.	4.45897	.2670	.0009	928.9	1196.4	53.849	6.32	10.49	666.
	70.	4.80437	.2878	.0009	960.8	1249.0	54.629	6.38	10.55	690.
	75.	5.14951	.3086	.0008	993.0	1301.9	55.359	6.46	10.62	712.
	80.	5.49446	.3294	.0008	1025.6	1355.3	56.048	6.56	10.71	733.
	90.	6.18390	.3709	.0007	1092.5	1463.5	57.324	6.80	10.94	773.
	100.	6.87291	.4123	.0006	1161.9	1574.3	58.489	7.07	11.21	809.
	110.	7.56159	.4537	.0005	1234.1	1687.8	59.568	7.36	11.50	842.
	120.	8.25003	.4951	.0005	1309.2	1804.2	60.582	7.66	11.80	873.
	140.	9.62644	.5777	.0004	1468.3	2045.8	62.443	8.22	12.35	932.
	160.	11.00241	.6604	.0004	1637.6	2297.8	64.123	8.70	12.83	987.
	180.	12.37810	.7430	.0003	1815.7	2558.3	65.658	9.09	13.22	1039.
	200.	13.75359	.8255	.0003	2000.7	2825.9	67.067	9.40	13.53	1090.
	220.	15.12893	.9081	.0003	2191.4	3099.1	68.369	9.65	13.78	1139.
	240.	16.50418	.9906	.0003	2386.5	3376.8	69.577	9.85	13.97	1186.
	260.	17.87935	1.0732	.0002	2585.0	3657.8	70.702	9.99	14.12	1231.
	280.	19.25446	1.1557	.0002	2786.1	3941.3	71.753	10.10	14.23	1276.
	300.	20.62801	1.2381	.0002	2989.1	4226.8	72.736	10.18	14.31	1319.
	350.	24.06523	1.4444	.0002	3501.7	4945.6	74.953	10.30	14.43	1422.
	400.	27.50233	1.6506	.0002	4018.2	5668.3	76.884	10.35	14.48	1519.
	450.	30.93934	1.8568	.0001	4536.5	6392.8	78.590	10.37	14.50	1611.
	500.	34.37630	2.0631	.0001	5055.5	7118.1	80.117	10.39	14.51	1698.
	550.	37.81322	2.2693	.0001	5575.3	7844.1	81.502	10.40	14.53	1780.
	600.	41.25012	2.4755	.0001	6096.1	8571.1	82.763	10.42	14.55	1859.
	650.	44.68700	2.6817	.0001	6617.7	9298.9	83.925	10.45	14.57	1934.
	700.	48.12386	2.8879	.0001	7140.9	10028.4	85.013	10.48	14.60	2006.
	750.	51.56071	3.0942	.0001	7666.2	10759.8	86.024	10.52	14.64	2075.
	800.	54.99756	3.3004	.0001	8193.5	11493.4	86.971	10.57	14.69	2142.
	850.	58.43440	3.5066	.0001	8723.6	12229.7	87.863	10.63	14.75	2206.
	900.	61.87123	3.7128	.0001	9256.8	12969.1	88.707	10.70	14.82	2268.
	950.	65.30806	3.9190	.0001	9793.5	13712.0	89.509	10.77	14.90	2328.
	1000.	68.74489	4.1252	.0001	10333.9	14458.6	90.275	10.86	14.98	2386.
	1100.	75.61853	4.5376	.0001	11429.3	15966.5	91.701	11.04	15.16	2497.
	1200.	82.49218	4.9501	.0001	12544.2	17493.7	93.022	11.24	15.36	2601.
	1300.	89.36587	5.3625	.0000	13679.8	19041.8	94.261	11.45	15.58	2701.
	1400.	96.23973	5.7749	.0000	14837.4	20611.7	95.431	11.68	15.81	2795.
	1500.	103.11423	6.1873	.0000	16017.8	22204.7	96.544	11.93	16.05	2886.
	1600.	109.99056	6.5997	.0000	17222.2	23821.7	97.581	12.19	16.32	2972.
	1700.	116.87148	7.0122	.0000	18455.7	25468.0	98.575	12.51	16.64	3055.
	1800.	123.76268	7.4246	.0000	19726.6	27152.3	99.536	12.93	17.08	3132.
	2000.	137.62628	8.2494	.0000	22446.6	30704.2	101.417	14.39	18.63	3268.
	2200.	151.78122	9.0742	.0000	25616.5	34723.3	103.322	17.51	22.03	3377.
	2400.	166.67898	9.8991	.0000	29730.3	39731.0	105.491	23.65	28.82	3471.
	2600.	183.17473	10.7239	.0000	35611.7	46602.2	108.235	34.40	41.00	3572.
	2800.	202.67903	11.5487	.0000	44465.4	56626.1	111.945	51.19	60.56	3695.
	3000.	227.24916	12.3736	.0000	57839.5	71474.4	117.065	74.57	89.35	3845.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.06 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.821	77.0455	620.4	.25644	89.8314	.01028	72.75	255.14	.00053	1.25168	2.2377
14.	76.8869	614.7	.25486	87.4981	.01056	74.58	248.65	.00054	1.25112	2.1640
15.	76.0618	606.0	.24296	78.8559	.01153	83.11	218.92	.00056	1.24822	1.8401
16.	75.1582	608.7	.23173	72.9692	.01221	88.97	194.90	.00057	1.24505	1.6286
17.	74.2067	608.1	.22269	67.3243	.01301	92.79	175.47	.00057	1.24172	1.4964
18.	73.2096	605.0	.21517	61.9320	.01391	95.47	159.47	.00056	1.23823	1.4060
* 18.621	72.5645	604.7	.21108	59.1157	.01442	96.53	150.87	.00055	1.23598	1.3626
* 18.621	.8384	178.9	.06666	.0556	.06446	15.44	10.26	.00575	1.00253	.7662
19.	.8185	183.1	.06678	.0558	.06246	15.59	10.47	.00600	1.00247	.7678
20.	.7708	194.0	.06699	.0564	.05790	16.11	11.01	.00670	1.00232	.7673
22.	.6916	215.9	.06714	.0573	.05086	17.59	12.08	.00834	1.00209	.7542
24.	.6282	237.8	.06714	.0578	.04556	19.11	13.12	.01011	1.00189	.7441
26.	.5759	259.5	.06711	.0582	.04137	20.64	14.15	.01202	1.00174	.7356
28.	.5321	281.0	.06707	.0586	.03794	22.18	15.15	.01407	1.00160	.7283
30.	.4947	302.4	.06703	.0588	.03508	23.71	16.13	.01627	1.00149	.7214
32.	.4623	323.7	.06701	.0590	.03264	25.10	17.08	.01850	1.00139	.7191
34.	.4340	344.9	.06698	.0591	.03053	26.49	18.02	.02087	1.00131	.7164
36.	.4091	366.0	.06695	.0593	.02870	27.89	18.94	.02337	1.00123	.7134
38.	.3869	387.1	.06692	.0594	.02707	29.29	19.85	.02600	1.00117	.7102
40.	.3670	408.2	.06689	.0594	.02563	30.68	20.73	.02876	1.00111	.7070
42.	.3492	429.2	.06686	.0595	.02434	32.06	21.60	.03163	1.00105	.7040
44.	.3330	450.3	.06683	.0596	.02318	33.43	22.45	.03463	1.00100	.7011
46.	.3182	471.3	.06678	.0596	.02213	34.78	23.29	.03773	1.00096	.6984
48.	.3047	492.4	.06673	.0597	.02117	36.12	24.12	.04094	1.00092	.6958
50.	.2924	513.6	.06666	.0597	.02029	37.44	24.93	.04425	1.00088	.6936
55.	.2655	566.9	.06640	.0598	.01839	40.64	26.90	.05287	1.00080	.6899
60.	.2431	621.2	.06602	.0598	.01682	43.72	28.80	.06197	1.00073	.6881
65.	.2243	676.6	.06549	.0599	.01550	46.88	30.63	.07176	1.00068	.6852
70.	.2081	733.7	.06480	.0599	.01437	49.80	32.41	.08167	1.00063	.6864
75.	.1942	792.6	.06397	.0599	.01340	52.76	34.14	.09209	1.00059	.6872
80.	.1820	853.4	.06302	.0599	.01255	55.31	35.82	.10212	1.00055	.6938
90.	.1617	982.0	.06080	.0600	.01114	61.88	39.05	.12587	1.00049	.6906
100.	.1455	1118.8	.05844	.0600	.01002	67.89	42.13	.14980	1.00044	.6959
110.	.1322	1263.1	.05611	.0600	.00911	76.30	44.75	.18059	1.00040	.6745
120.	.1212	1413.7	.05392	.0600	.00834	82.90	47.58	.20874	1.00037	.6770
140.	.1039	1728.1	.05024	.0600	.00715	96.11	53.00	.26964	1.00031	.6812
160.	.0909	2051.7	.04747	.0600	.00625	109.19	58.14	.33717	1.00027	.6830
180.	.0808	2378.9	.04542	.0600	.00556	121.91	63.06	.41099	1.00024	.6838
200.	.0727	2706.0	.04390	.0600	.00500	134.11	67.80	.49076	1.00022	.6840
220.	.0661	3032.0	.04275	.0600	.00455	145.74	72.38	.57599	1.00020	.6844
240.	.0606	3354.0	.04191	.0600	.00417	156.80	76.82	.66673	1.00018	.6846
260.	.0559	3671.8	.04129	.0600	.00385	167.33	81.15	.76277	1.00017	.6848
280.	.0519	3985.1	.04084	.0600	.00357	177.37	85.36	.86404	1.00016	.6848
300.	.0485	4293.8	.04052	.0600	.00333	186.99	89.48	.97039	1.00015	.6848
350.	.0416	5050.0	.04006	.0600	.00286	209.49	99.40	1.25811	1.00013	.6845
400.	.0364	5791.3	.03986	.0600	.00250	230.30	108.86	1.57525	1.00011	.6842
450.	.0323	6524.3	.03978	.0600	.00222	249.94	117.95	1.92055	1.00010	.6840
500.	.0291	7258.5	.03971	.0600	.00200	268.77	126.70	2.29164	1.00009	.6842
550.	.0264	7992.1	.03965	.0600	.00182	287.03	135.18	2.68943	1.00008	.6842
600.	.0242	8729.9	.03958	.0600	.00167	304.91	143.40	3.11260	1.00007	.6842
650.	.0224	9472.1	.03949	.0600	.00154	322.54	151.41	3.55132	1.00007	.6840
700.	.0208	10223.8	.03937	.0600	.00143	340.02	159.23	4.03387	1.00006	.6838
750.	.0194	10984.3	.03921	.0600	.00133	357.42	166.87	4.53056	1.00006	.6837
800.	.0182	11756.1	.03903	.0600	.00125	374.78	174.35	5.05029	1.00005	.6835
850.	.0171	12541.0	.03881	.0600	.00118	392.17	181.68	5.59231	1.00005	.6834
900.	.0162	13340.2	.03856	.0600	.00111	409.60	188.89	6.15589	1.00005	.6834
950.	.0153	14154.5	.03829	.0600	.00105	427.10	195.97	6.74037	1.00005	.6836
1000.	.0145	14984.6	.03799	.0600	.00100	444.69	202.95	7.34521	1.00004	.6838
1100.	.0132	16681.9	.03736	.0600	.00091	475.56	216.59	8.53758	1.00004	.6906
1200.	.0121	18438.2	.03670	.0600	.00083	511.03	229.87	9.87799	1.00004	.6911
1300.	.0112	20254.2	.03601	.0600	.00077	547.01	242.83	11.29643	1.00003	.6916
1400.	.0104	22132.3	.03531	.0600	.00071	583.68	255.49	12.79295	1.00003	.6919
1500.	.0097	24081.6	.03458	.0600	.00067	621.49	267.89	14.37125	1.00003	.6920
1600.	.0091	26112.3	.03384	.0600	.00062	661.21	280.05	16.04321	1.00003	.6912
1700.	.0086	28294.5	.03298	.0600	.00059	705.51	291.97	17.83423	1.00003	.6888
1800.	.0081	30738.0	.03192	.0600	.00056	758.72	303.68	19.79253	1.00002	.6836
2000.	.0073	37229.0	.02870	.0599	.00050	923.40	326.51	24.55330	1.00002	.6589
2200.	.0066	48286.9	.02364	.0598	.00046	1257.25	345.27	31.18709	1.00002	.6049
2400.	.0060	68472.6	.01762	.0594	.00042	1931.32	367.49	40.20626	1.00002	.5484
2600.	.0055	104017.0	.01229	.0585	.00039	3177.04	390.51	51.09713	1.00002	.5040
2800.	.0049	161294.5	.00848	.0570	.00038	5229.81	415.22	62.90863	1.00001	.4816
3000.	.0044	243245.4	.00610	.0544	.00037	8196.95	441.99	75.05428	1.00001	.4818

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.08 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.828	.01298	1.1672	.9241	218.3	219.3	14.083	4.68	6.38	1262.
14.	.01300	1.1411	.9241	219.4	220.4	14.165	4.71	6.49	1253.
15.	.01314	1.0388	.9097	226.1	227.1	14.627	4.92	6.98	1214.
16.	.01330	.9729	.8919	233.3	234.3	15.093	5.12	7.43	1189.
17.	.01347	.9092	.8768	241.0	242.0	15.559	5.30	7.91	1165.
18.	.01366	.8480	.8623	249.1	250.2	16.026	5.47	8.41	1142.
19.	.01385	.7833	.8470	257.8	258.9	16.495	5.62	8.96	1117.
* 19.496	.01396	.7643	.8384	262.3	263.4	16.729	5.69	9.18	1111.
* 19.496	.92223	.0671	.0047	638.1	711.9	39.738	6.46	11.84	351.
20.	.95189	.0698	.0045	641.7	717.8	40.039	6.41	11.68	356.
22.	1.06682	.0800	.0040	655.4	740.7	41.133	6.32	11.27	378.
24.	1.17885	.0897	.0036	668.7	763.0	42.103	6.27	11.04	397.
26.	1.28903	.0990	.0033	681.8	784.9	42.979	6.25	10.89	415.
28.	1.39792	.1082	.0030	694.8	806.6	43.781	6.24	10.79	433.
30.	1.50585	.1172	.0028	707.7	828.1	44.524	6.23	10.72	449.
32.	1.61305	.1261	.0026	720.4	849.5	45.213	6.23	10.66	465.
34.	1.71967	.1349	.0024	733.2	870.7	45.858	6.22	10.61	480.
36.	1.82582	.1437	.0023	745.9	891.9	46.463	6.22	10.57	494.
38.	1.93160	.1523	.0022	758.5	913.0	47.034	6.21	10.54	508.
40.	2.03707	.1610	.0020	771.1	934.1	47.574	6.21	10.52	522.
42.	2.14228	.1695	.0019	783.7	955.1	48.087	6.21	10.50	535.
44.	2.24726	.1781	.0018	796.3	976.1	48.574	6.21	10.48	548.
46.	2.35206	.1866	.0018	808.9	997.0	49.040	6.21	10.47	561.
48.	2.45670	.1951	.0017	821.4	1018.0	49.485	6.21	10.46	573.
50.	2.56120	.2036	.0016	834.0	1038.9	49.912	6.22	10.45	585.
55.	2.82196	.2247	.0015	865.3	1091.1	50.908	6.24	10.45	613.
60.	3.08215	.2457	.0013	896.8	1143.4	51.818	6.27	10.47	640.
65.	3.34194	.2666	.0012	928.4	1195.8	52.656	6.32	10.50	666.
70.	3.60140	.2875	.0011	960.3	1248.4	53.437	6.38	10.56	690.
75.	3.86062	.3084	.0011	992.6	1301.4	54.168	6.47	10.63	712.
80.	4.11964	.3292	.0010	1025.2	1354.8	54.857	6.56	10.72	733.
90.	4.63723	.3708	.0009	1092.2	1463.1	56.134	6.80	10.95	773.
100.	5.15438	.4123	.0008	1161.6	1574.0	57.300	7.07	11.22	809.
110.	5.67121	.4537	.0007	1233.8	1687.5	58.379	7.36	11.51	842.
120.	6.18780	.4951	.0007	1309.0	1804.0	59.393	7.66	11.80	873.
140.	7.22050	.5779	.0006	1468.1	2045.7	61.255	8.22	12.35	932.
160.	8.25276	.6605	.0005	1637.5	2297.7	62.936	8.70	12.83	987.
180.	9.28474	.7432	.0004	1815.5	2558.3	64.470	9.09	13.22	1040.
200.	10.31652	.8257	.0004	2000.6	2825.9	65.880	9.40	13.53	1090.
220.	11.34817	.9083	.0004	2191.3	3099.2	67.182	9.65	13.78	1139.
240.	12.37971	.9909	.0003	2386.4	3376.8	68.390	9.85	13.97	1186.
260.	13.41117	1.0734	.0003	2584.9	3657.8	69.516	9.99	14.12	1232.
280.	14.44257	1.1560	.0003	2786.0	3941.4	70.566	10.10	14.23	1276.
300.	15.47280	1.2384	.0003	2989.0	4226.9	71.550	10.18	14.31	1319.
350.	18.05083	1.4447	.0002	3501.6	4945.7	73.767	10.30	14.43	1422.
400.	20.62872	1.6509	.0002	4018.1	5668.4	75.697	10.35	14.48	1519.
450.	23.20653	1.8572	.0002	4536.4	6393.0	77.403	10.37	14.50	1611.
500.	25.78429	2.0634	.0002	5055.5	7118.3	78.931	10.39	14.51	1698.
550.	28.36201	2.2696	.0001	5575.2	7844.2	80.315	10.40	14.53	1780.
600.	30.93970	2.4759	.0001	6096.0	8571.2	81.577	10.42	14.55	1859.
650.	33.51738	2.6821	.0001	6617.7	9299.1	82.739	10.45	14.57	1934.
700.	36.09504	2.8883	.0001	7140.9	10028.5	83.827	10.48	14.60	2006.
750.	38.67269	3.0945	.0001	7666.2	10760.0	84.837	10.52	14.64	2075.
800.	41.25034	3.3007	.0001	8193.5	11493.5	85.785	10.57	14.69	2142.
850.	43.82798	3.5069	.0001	8723.6	12229.9	86.677	10.63	14.75	2206.
900.	46.40561	3.7131	.0001	9256.8	12969.3	87.521	10.70	14.82	2268.
950.	48.98324	3.9194	.0001	9793.5	13712.1	88.323	10.77	14.90	2328.
1000.	51.56086	4.1256	.0001	10333.9	14458.8	89.088	10.86	14.98	2386.
1100.	56.71611	4.5380	.0001	11429.3	15966.6	90.515	11.04	15.16	2497.
1200.	61.87135	4.9504	.0001	12544.2	17493.9	91.836	11.24	15.36	2601.
1300.	67.02661	5.3628	.0001	13679.8	19041.9	93.074	11.45	15.58	2701.
1400.	72.18199	5.7753	.0001	14837.3	20611.8	94.245	11.68	15.81	2795.
1500.	77.33778	6.1877	.0001	16017.5	22204.5	95.358	11.92	16.05	2886.
1600.	82.49476	6.6001	.0001	17221.2	23820.8	96.394	12.18	16.31	2973.
1700.	87.65472	7.0125	.0000	18453.0	25465.3	97.386	12.48	16.62	3055.
1800.	92.82135	7.4249	.0000	19719.8	27145.5	98.346	12.87	17.02	3133.
2000.	103.20737	8.2498	.0000	22415.9	30672.5	100.213	14.19	18.42	3272.
2200.	113.78262	9.0746	.0000	25510.3	34613.0	102.081	16.94	21.40	3385.
2400.	124.84038	9.8994	.0000	29430.8	39418.0	104.163	22.30	27.33	3481.
2600.	136.93628	10.7243	.0000	34890.3	45845.2	106.729	31.67	37.91	3580.
2800.	150.98825	11.5491	.0000	42933.9	55012.9	110.124	46.35	55.00	3698.
3000.	168.34401	12.3739	.0000	54917.2	68384.7	114.736	66.97	80.08	3841.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.08 MPA ISOBAR

	TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
*	13.828	77.0570	621.0	.25641	89.9428	.01027	72.84	255.26	.00053	1.25172	2.2363
	14.	76.9043	615.9	.25489	87.7567	.01053	74.60	249.01	.00054	1.25118	2.1649
	15.	76.0803	606.6	.24313	79.0342	.01151	83.13	219.23	.00056	1.24829	1.8415
	16.	75.1781	609.4	.23189	73.1378	.01219	89.00	195.17	.00057	1.24512	1.6295
	17.	74.2283	608.8	.22283	67.4898	.01299	92.83	175.71	.00057	1.24179	1.4971
	18.	73.2332	605.8	.21531	62.1031	.01388	95.52	159.70	.00056	1.23831	1.4063
	19.	72.1879	598.0	.20884	56.5441	.01498	97.05	146.25	.00054	1.23466	1.3499
*	19.496	71.6402	599.5	.20583	54.7547	.01531	97.43	140.27	.00053	1.23276	1.3216
*	19.496	1.0843	184.6	.06665	.0727	.06416	16.11	10.80	.00452	1.00327	.7936
	20.	1.0505	190.1	.06684	.0733	.06144	16.41	11.07	.00481	1.00317	.7879
	22.	.9374	212.4	.06720	.0750	.05307	17.81	12.13	.00607	1.00283	.7677
	24.	.8483	234.6	.06727	.0761	.04707	19.29	13.17	.00741	1.00256	.7540
	26.	.7758	256.6	.06725	.0768	.04246	20.80	14.19	.00886	1.00234	.7434
	28.	.7153	278.4	.06720	.0774	.03876	22.31	15.19	.01041	1.00216	.7347
	30.	.6641	300.1	.06715	.0778	.03570	23.83	16.17	.01206	1.00200	.7269
	32.	.6199	321.6	.06712	.0782	.03313	25.22	17.12	.01374	1.00187	.7235
	34.	.5815	343.0	.06709	.0785	.03093	26.60	18.06	.01553	1.00175	.7201
	36.	.5477	364.3	.06705	.0787	.02901	28.00	18.98	.01741	1.00165	.7165
	38.	.5177	385.6	.06702	.0789	.02734	29.39	19.88	.01939	1.00156	.7129
	40.	.4909	406.8	.06698	.0790	.02585	30.78	20.76	.02146	1.00148	.7094
	42.	.4668	427.9	.06695	.0791	.02453	32.15	21.63	.02363	1.00141	.7061
	44.	.4450	449.0	.06691	.0792	.02334	33.52	22.48	.02587	1.00134	.7029
	46.	.4252	470.2	.06686	.0793	.02226	34.87	23.32	.02821	1.00128	.7000
	48.	.4070	491.3	.06681	.0794	.02128	36.20	24.14	.03062	1.00123	.6973
	50.	.3904	512.6	.06674	.0795	.02039	37.52	24.95	.03311	1.00118	.6949
	55.	.3544	566.1	.06647	.0796	.01846	40.72	26.92	.03959	1.00107	.6909
	60.	.3244	620.5	.06608	.0797	.01687	43.78	28.82	.04642	1.00098	.6889
	65.	.2992	676.0	.06554	.0798	.01554	46.94	30.65	.05377	1.00090	.6858
	70.	.2777	733.2	.06485	.0798	.01440	49.86	32.43	.06122	1.00084	.6869
	75.	.2590	792.1	.06402	.0799	.01342	52.81	34.16	.06903	1.00078	.6877
	80.	.2427	853.1	.06306	.0799	.01257	55.36	35.83	.07656	1.00073	.6941
	90.	.2156	981.7	.06083	.0800	.01116	61.92	39.06	.09439	1.00065	.6908
	100.	.1940	1118.6	.05847	.0800	.01003	67.93	42.15	.11236	1.00058	.6960
	110.	.1763	1262.9	.05613	.0800	.00911	76.32	44.75	.13541	1.00053	.6747
	120.	.1616	1413.7	.05395	.0800	.00835	82.92	47.58	.15654	1.00049	.6772
	140.	.1385	1728.2	.05026	.0800	.00715	96.12	53.00	.20223	1.00042	.6813
	160.	.1212	2051.8	.04749	.0800	.00625	109.20	58.14	.25289	1.00037	.6831
	180.	.1077	2379.1	.04543	.0800	.00556	121.92	63.06	.30826	1.00032	.6838
	200.	.0969	2706.3	.04391	.0800	.00500	134.12	67.80	.36810	1.00029	.6841
	220.	.0881	3032.3	.04276	.0800	.00455	145.74	72.38	.43203	1.00027	.6844
	240.	.0808	3354.3	.04192	.0800	.00417	156.80	76.83	.50010	1.00024	.6846
	260.	.0746	3672.2	.04130	.0800	.00385	167.33	81.15	.57213	1.00022	.6848
	280.	.0692	3985.5	.04085	.0800	.00357	177.38	85.36	.64810	1.00021	.6848
	300.	.0646	4294.2	.04052	.0800	.00333	187.00	89.48	.72787	1.00019	.6848
	350.	.0554	5050.5	.04006	.0800	.00286	209.49	99.40	.94368	1.00017	.6845
	400.	.0485	5791.8	.03987	.0800	.00250	230.31	108.87	1.18155	1.00015	.6842
	450.	.0431	6524.8	.03978	.0800	.00222	249.95	117.95	1.44054	1.00013	.6840
	500.	.0388	7259.1	.03971	.0800	.00200	268.77	126.70	1.71887	1.00012	.6842
	550.	.0353	7992.6	.03965	.0800	.00182	287.03	135.18	2.01723	1.00011	.6842
	600.	.0323	8730.5	.03958	.0800	.00167	304.91	143.41	2.33461	1.00010	.6842
	650.	.0298	9472.7	.03949	.0800	.00154	322.54	151.41	2.67117	1.00009	.6840
	700.	.0277	10224.4	.03937	.0800	.00143	340.02	159.23	3.02559	1.00008	.6838
	750.	.0259	10984.9	.03922	.0800	.00133	357.42	166.87	3.39812	1.00008	.6837
	800.	.0242	11756.8	.03903	.0800	.00125	374.79	174.35	3.78793	1.00007	.6835
	850.	.0228	12541.6	.03881	.0800	.00118	392.17	181.68	4.19445	1.00007	.6834
	900.	.0215	13340.8	.03857	.0800	.00111	409.60	188.89	4.61714	1.00006	.6834
	950.	.0204	14155.1	.03829	.0800	.00105	427.10	195.97	5.05551	1.00006	.6836
	1000.	.0194	14985.3	.03799	.0800	.00100	444.69	202.95	5.50916	1.00006	.6838
	1100.	.0176	16682.5	.03736	.0800	.00091	475.56	216.59	6.40342	1.00005	.6906
	1200.	.0162	18438.8	.03670	.0800	.00083	511.03	229.87	7.40874	1.00005	.6911
	1300.	.0149	20254.5	.03601	.0800	.00077	547.00	242.83	8.47251	1.00004	.6916
	1400.	.0139	22131.2	.03531	.0800	.00071	583.61	255.49	9.59459	1.00004	.6920
	1500.	.0129	24076.2	.03459	.0800	.00067	621.25	267.89	10.77724	1.00004	.6921
	1600.	.0121	26095.2	.03387	.0800	.00062	660.51	280.05	12.02811	1.00004	.6915
	1700.	.0114	28249.6	.03305	.0800	.00059	703.72	291.97	13.36360	1.00003	.6894
	1800.	.0108	30634.0	.03205	.0800	.00056	754.63	303.68	14.81525	1.00003	.6849
	2000.	.0097	36800.1	.02910	.0799	.00050	906.81	326.50	18.29582	1.00003	.6630
	2200.	.0088	46936.4	.02443	.0798	.00046	1205.55	345.22	23.07476	1.00003	.6128
	2400.	.0080	65008.2	.01866	.0793	.00042	1799.67	367.32	29.59769	1.00002	.5578
	2600.	.0073	96500.5	.01330	.0783	.00039	2893.04	390.07	37.61649	1.00002	.5112
	2800.	.0066	147253.4	.00931	.0765	.00037	4701.65	414.33	46.46257	1.00002	.4847
	3000.	.0059	220733.0	.00670	.0735	.00036	7352.97	440.64	55.64640	1.00002	.4799

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.10 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ	C^{P} KG-K	VELOCITY OF SOUND M/S
* 13.834	.01298	1.1685	.9244	218.3	219.6	14.084	4.68	6.38	1262.
14.	.01300	1.1442	.9243	219.4	220.7	14.162	4.71	6.46	1254.
15.	.01314	1.0409	.9104	226.0	227.3	14.624	4.92	6.98	1216.
16.	.01330	.9748	.8925	233.2	234.6	15.090	5.12	7.43	1190.
17.	.01347	.9112	.8774	240.9	242.2	15.556	5.30	7.91	1166.
18.	.01365	.8501	.8630	249.0	250.4	16.022	5.47	8.41	1143.
19.	.01385	.7853	.8476	257.7	259.1	16.490	5.62	8.95	1119.
20.	.01406	.7221	.8304	266.9	268.3	16.963	5.75	9.53	1094.
* 20.224	.01412	.7122	.8261	269.1	270.5	17.072	5.77	9.64	1090.
* 20.224	.75454	.0675	.0057	640.6	716.0	39.109	6.50	12.14	355.
22.	.83883	.0770	.0051	653.2	737.1	40.108	6.37	11.60	375.
24.	.93068	.0872	.0046	666.8	759.9	41.102	6.30	11.27	395.
26.	1.02048	.0969	.0041	680.2	782.2	41.994	6.27	11.07	413.
28.	1.10890	.1063	.0038	693.3	804.2	42.808	6.26	10.93	431.
30.	1.19630	.1156	.0035	706.3	826.0	43.559	6.25	10.83	448.
32.	1.28294	.1246	.0033	719.2	847.5	44.255	6.24	10.75	463.
34.	1.36898	.1336	.0031	732.1	869.0	44.905	6.23	10.69	479.
36.	1.45454	.1425	.0029	744.8	890.3	45.515	6.22	10.64	493.
38.	1.53972	.1512	.0027	757.6	911.5	46.089	6.22	10.60	508.
40.	1.62458	.1600	.0026	770.2	932.7	46.632	6.22	10.57	521.
42.	1.70918	.1686	.0024	782.9	953.8	47.146	6.22	10.54	535.
44.	1.79355	.1772	.0023	795.5	974.9	47.636	6.22	10.52	548.
46.	1.87774	.1858	.0022	808.1	995.9	48.103	6.22	10.50	560.
48.	1.96176	.1944	.0021	820.7	1016.9	48.550	6.22	10.49	573.
50.	2.04564	.2029	.0020	833.3	1037.9	48.978	6.22	10.48	585.
55.	2.25484	.2241	.0018	864.7	1090.2	49.977	6.24	10.47	613.
60.	2.46349	.2452	.0017	896.3	1142.6	50.889	6.27	10.49	640.
65.	2.67172	.2663	.0016	927.9	1195.1	51.728	6.32	10.52	666.
70.	2.87963	.2872	.0014	959.9	1247.9	52.510	6.39	10.57	690.
75.	3.08729	.3081	.0013	992.2	1300.9	53.242	6.47	10.64	712.
80.	3.29475	.3290	.0013	1024.9	1354.3	53.932	6.56	10.73	734.
90.	3.70923	.3706	.0011	1091.8	1462.8	55.210	6.80	10.96	773.
100.	4.12327	.4122	.0010	1161.3	1573.6	56.377	7.07	11.22	809.
110.	4.53698	.4537	.0009	1233.6	1687.3	57.456	7.36	11.51	842.
120.	4.95046	.4952	.0008	1308.8	1803.8	58.471	7.66	11.80	873.
140.	5.77694	.5780	.0007	1467.9	2045.6	60.334	8.22	12.36	932.
160.	6.60298	.6607	.0006	1637.3	2297.6	62.014	8.70	12.83	987.
180.	7.42873	.7433	.0006	1815.4	2558.3	63.549	9.09	13.22	1040.
200.	8.25429	.8260	.0005	2000.5	2825.9	64.959	9.40	13.53	1090.
220.	9.07970	.9086	.0005	2191.2	3099.2	66.261	9.65	13.78	1139.
240.	9.90502	.9911	.0004	2386.3	3376.8	67.470	9.85	13.97	1186.
260.	10.73026	1.0737	.0004	2584.9	3657.9	68.595	9.99	14.12	1232.
280.	11.55544	1.1562	.0004	2785.9	3941.5	69.645	10.10	14.23	1276.
300.	12.37968	1.2387	.0003	2989.0	4226.9	70.629	10.18	14.31	1319.
350.	14.44218	1.4450	.0003	3501.6	4945.8	72.846	10.30	14.43	1423.
400.	16.50455	1.6512	.0003	4018.1	5668.5	74.777	10.35	14.48	1520.
450.	18.56684	1.8575	.0002	4536.4	6393.1	76.483	10.37	14.50	1611.
500.	20.62908	2.0637	.0002	5055.5	7118.4	78.010	10.39	14.51	1698.
550.	22.69128	2.2700	.0002	5575.2	7844.3	79.395	10.40	14.53	1780.
600.	24.75345	2.4762	.0002	6096.0	8571.4	80.657	10.42	14.55	1859.
650.	26.81561	2.6824	.0002	6617.7	9299.2	81.819	10.45	14.57	1934.
700.	28.87775	2.8886	.0001	7140.9	10028.7	82.906	10.48	14.60	2006.
750.	30.93988	3.0949	.0001	7666.1	10760.1	83.917	10.52	14.64	2076.
800.	33.00201	3.3011	.0001	8193.5	11493.7	84.864	10.57	14.69	2142.
850.	35.06412	3.5073	.0001	8723.6	12230.0	85.756	10.63	14.75	2206.
900.	37.12624	3.7135	.0001	9256.8	12969.4	86.601	10.70	14.82	2268.
950.	39.18834	3.9197	.0001	9793.5	13712.3	87.403	10.77	14.90	2328.
1000.	41.25045	4.1259	.0001	10333.9	14459.0	88.168	10.86	14.98	2386.
1100.	45.37465	4.5383	.0001	11429.3	15966.8	89.594	11.04	15.16	2497.
1200.	49.49885	4.9508	.0001	12544.2	17494.1	90.916	11.24	15.36	2601.
1300.	53.62306	5.3632	.0001	13679.8	19042.1	92.154	11.45	15.58	2701.
1400.	57.74736	5.7756	.0001	14837.2	20611.9	93.324	11.68	15.81	2796.
1500.	61.87194	6.1880	.0001	16017.2	22204.4	94.437	11.92	16.05	2886.
1600.	65.99738	6.6004	.0001	17220.5	23820.2	95.473	12.17	16.30	2973.
1700.	70.12495	7.0129	.0001	18451.1	25463.6	96.465	12.46	16.60	3056.
1800.	74.25729	7.4253	.0001	19715.2	27140.9	97.422	12.83	16.98	3134.
2000.	82.55973	8.2501	.0001	22395.0	30651.0	99.281	14.05	18.27	3275.
2200.	90.99757	9.0750	.0000	25437.9	34537.7	101.124	16.55	20.97	3391.
2400.	99.78068	9.8998	.0000	29226.4	39204.5	103.146	21.38	26.31	3488.
2600.	109.30674	10.7246	.0000	34397.9	45328.6	105.591	29.81	35.81	3586.
2800.	120.23330	11.5495	.0000	41887.9	53911.2	108.770	43.02	51.14	3701.
3000.	133.52968	12.3743	.0000	52916.7	66269.7	113.034	61.69	73.70	3839.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.10 MPA ISOBAR

	TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_p$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_p/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
*	13.834	77.0685	621.7	.25639	90.0543	.01026	72.92	255.39	.00053	1.25176	2.2349
	14.	76.9216	617.1	.25492	88.0151	.01050	74.61	249.37	.00054	1.25124	2.1659
	15.	76.0988	607.3	.24330	79.2124	.01149	83.15	219.54	.00056	1.24835	1.8428
	16.	75.1978	610.0	.23204	73.3062	.01218	89.03	195.44	.00057	1.24519	1.6305
	17.	74.2500	609.5	.22298	67.6550	.01297	92.87	175.96	.00057	1.24187	1.4977
	18.	73.2568	606.6	.21545	62.2739	.01386	95.57	159.92	.00056	1.23840	1.4067
	19.	72.2131	598.8	.20897	56.7088	.01495	97.10	146.46	.00054	1.23475	1.3500
	20.	71.1039	588.9	.20322	51.3422	.01617	98.44	134.88	.00052	1.23089	1.3051
*	20.224	70.8360	588.4	.20198	50.4463	.01638	98.84	132.43	.00052	1.22996	1.2911
*	20.224	1.3253	188.9	.06666	.0894	.06427	16.89	11.25	.00378	1.00400	.8085
	22.	1.1921	208.8	.06722	.0918	.05556	18.05	12.19	.00470	1.00360	.7831
	24.	1.0745	231.3	.06738	.0937	.04872	19.48	13.22	.00579	1.00324	.7648
	26.	.9799	253.7	.06738	.0950	.04362	20.96	14.24	.00696	1.00296	.7517
	28.	.9018	275.9	.06733	.0959	.03961	22.46	15.23	.00820	1.00272	.7414
	30.	.8359	297.8	.06727	.0966	.03636	23.96	16.21	.00953	1.00252	.7325
	32.	.7795	319.5	.06723	.0971	.03364	25.34	17.16	.01089	1.00235	.7281
	34.	.7305	341.1	.06719	.0976	.03133	26.72	18.10	.01232	1.00220	.7239
	36.	.6875	362.6	.06715	.0979	.02934	28.10	19.01	.01383	1.00207	.7197
	38.	.6495	384.0	.06711	.0982	.02760	29.49	19.91	.01542	1.00196	.7157
	40.	.6155	405.3	.06707	.0985	.02607	30.88	20.79	.01709	1.00186	.7117
	42.	.5851	426.6	.06704	.0987	.02471	32.24	21.66	.01882	1.00176	.7081
	44.	.5576	447.8	.06699	.0988	.02349	33.60	22.51	.02062	1.00168	.7047
	46.	.5326	469.0	.06694	.0990	.02239	34.95	23.35	.02250	1.00161	.7016
	48.	.5097	490.3	.06688	.0991	.02140	36.29	24.17	.02443	1.00154	.6987
	50.	.4888	511.6	.06681	.0992	.02049	37.60	24.98	.02642	1.00147	.6962
	55.	.4435	565.3	.06653	.0994	.01853	40.79	26.95	.03161	1.00134	.6919
	60.	.4059	619.8	.06614	.0995	.01692	43.85	28.84	.03709	1.00122	.6897
	65.	.3743	675.4	.06560	.0997	.01557	47.01	30.67	.04298	1.00113	.6864
	70.	.3473	732.7	.06490	.0997	.01443	49.91	32.45	.04894	1.00105	.6873
	75.	.3239	791.7	.06406	.0998	.01345	52.86	34.17	.05520	1.00098	.6881
	80.	.3035	852.7	.06310	.0999	.01259	55.41	35.85	.06123	1.00091	.6945
	90.	.2696	981.4	.06087	.0999	.01117	61.97	39.08	.07551	1.00081	.6911
	100.	.2425	1118.3	.05850	.1000	.01004	67.97	42.16	.08989	1.00073	.6962
	110.	.2204	1262.8	.05616	.1000	.00912	76.33	44.75	.10831	1.00066	.6749
	120.	.2020	1413.6	.05397	.1000	.00835	82.93	47.59	.12521	1.00061	.6773
	140.	.1731	1728.2	.05028	.1000	.00715	96.13	53.00	.16178	1.00052	.6814
	160.	.1514	2051.9	.04750	.1001	.00625	109.21	58.15	.20232	1.00046	.6832
	180.	.1346	2379.3	.04544	.1001	.00556	121.93	63.07	.24663	1.00041	.6839
	200.	.1211	2706.5	.04392	.1001	.00500	134.12	67.80	.29451	1.00037	.6841
	220.	.1101	3032.5	.04277	.1001	.00454	145.75	72.38	.34566	1.00033	.6845
	240.	.1010	3354.6	.04193	.1001	.00417	156.81	76.83	.40012	1.00030	.6847
	260.	.0932	3672.6	.04131	.1001	.00385	167.34	81.15	.45775	1.00028	.6848
	280.	.0865	3985.9	.04086	.1001	.00357	177.38	85.37	.51853	1.00026	.6848
	300.	.0808	4294.7	.04053	.1001	.00333	187.00	89.48	.58236	1.00024	.6848
	350.	.0692	5051.0	.04007	.1001	.00286	209.50	99.40	.75502	1.00021	.6845
	400.	.0606	5792.3	.03987	.1000	.00250	230.31	108.87	.94533	1.00018	.6843
	450.	.0539	6525.3	.03979	.1000	.00222	249.95	117.97	1.15253	1.00016	.6840
	500.	.0485	7259.6	.03971	.1000	.00200	268.77	126.70	1.37521	1.00015	.6842
	550.	.0441	7993.2	.03966	.1000	.00182	287.04	135.18	1.61390	1.00013	.6842
	600.	.0404	8731.0	.03958	.1000	.00167	304.92	143.41	1.86782	1.00012	.6842
	650.	.0373	9473.3	.03950	.1000	.00154	322.55	151.41	2.13707	1.00011	.6840
	700.	.0346	10225.0	.03937	.1000	.00143	340.02	159.23	2.42062	1.00010	.6838
	750.	.0323	10985.5	.03922	.1000	.00133	357.42	166.87	2.71865	1.00010	.6837
	800.	.0303	11757.4	.03903	.1000	.00125	374.79	174.35	3.03051	1.00009	.6835
	850.	.0285	12542.2	.03882	.1000	.00118	392.17	181.68	3.35574	1.00009	.6834
	900.	.0269	13341.4	.03857	.1000	.00111	409.60	188.89	3.69390	1.00008	.6834
	950.	.0255	14155.8	.03829	.1000	.00105	427.10	195.97	4.04460	1.00008	.6836
	1000.	.0242	14985.9	.03799	.1000	.00100	444.69	202.95	4.40752	1.00007	.6838
	1100.	.0220	16683.1	.03737	.1000	.00091	475.56	216.59	5.12293	1.00007	.6906
	1200.	.0202	18439.4	.03670	.1000	.00083	511.02	229.87	5.92719	1.00006	.6911
	1300.	.0186	20254.8	.03601	.1000	.00077	546.98	242.83	6.77817	1.00006	.6916
	1400.	.0173	22130.6	.03531	.1000	.00071	583.56	255.49	7.67568	1.00005	.6920
	1500.	.0162	24072.7	.03460	.1000	.00067	621.08	267.89	8.62122	1.00005	.6921
	1600.	.0152	26083.8	.03389	.1000	.00062	660.02	280.05	9.62022	1.00005	.6916
	1700.	.0143	28219.3	.03309	.1000	.00059	702.50	291.97	10.68435	1.00004	.6899
	1800.	.0135	30563.2	.03215	.1000	.00056	751.84	303.68	11.83628	1.00004	.6859
	2000.	.0121	36537.6	.02938	.0999	.00050	895.49	326.49	14.57039	1.00004	.6660
	2200.	.0110	46014.3	.02500	.0997	.00046	1170.24	345.18	18.27896	1.00003	.6186
	2400.	.0100	62638.6	.01945	.0992	.00042	1709.61	367.20	23.34499	1.00003	.5650
	2600.	.0091	91340.2	.01410	.0981	.00039	2698.04	389.76	29.65132	1.00003	.5173
	2800.	.0083	137536.3	.00998	.0961	.00037	4336.07	413.69	36.70298	1.00003	.4879
	3000.	.0075	204885.4	.00721	.0927	.00036	6758.73	439.62	44.08577	1.00002	.4794

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.101325 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.835	.01298	1.1686	.9244	218.3	219.6	14.084	4.68	6.38	1263.
	14.	.01300	1.1444	.9243	219.3	220.7	14.162	4.71	6.48	1254.
	15.	.01314	1.0411	.9105	226.0	227.4	14.624	4.92	6.98	1216.
	16.	.01330	.9750	.8926	233.2	234.6	15.089	5.12	7.43	1190.
	17.	.01347	.9113	.8775	240.9	242.3	15.555	5.30	7.90	1166.
	18.	.01365	.8502	.8630	249.0	250.4	16.022	5.47	8.41	1143.
	19.	.01385	.7854	.8477	257.7	259.1	16.490	5.62	8.95	1119.
	20.	.01406	.7222	.8305	266.9	268.3	16.963	5.75	9.52	1094.
*	20.268	.01413	.7093	.8253	269.5	270.9	17.093	5.78	9.66	1089.
*	20.268	.74739	.0675	.0058	640.7	716.5	39.082	6.50	12.15	355.
	22.	.82689	.0768	.0052	653.0	736.8	40.047	6.37	11.52	374.
	24.	.91769	.0870	.0046	666.7	759.7	41.043	6.31	11.29	395.
	26.	1.00643	.0968	.0042	680.1	782.0	41.935	6.27	11.08	413.
	28.	1.09378	.1062	.0039	693.2	804.1	42.750	6.26	10.94	431.
	30.	1.18011	.1154	.0036	706.2	825.8	43.501	6.25	10.83	448.
	32.	1.26567	.1245	.0033	719.2	847.4	44.198	6.24	10.76	463.
	34.	1.35063	.1335	.0031	732.0	868.8	44.848	6.23	10.69	479.
	36.	1.43512	.1424	.0029	744.8	890.2	45.458	6.22	10.64	493.
	38.	1.51922	.1512	.0027	757.5	911.4	46.033	6.22	10.60	508.
	40.	1.60300	.1599	.0026	770.2	932.6	46.576	6.22	10.57	521.
	42.	1.68652	.1686	.0025	782.8	953.7	47.091	6.22	10.54	535.
	44.	1.76982	.1772	.0024	795.5	974.8	47.581	6.22	10.52	548.
	46.	1.85292	.1858	.0022	808.1	995.8	48.048	6.22	10.51	560.
	48.	1.93587	.1943	.0021	820.7	1016.8	48.495	6.22	10.49	573.
	50.	2.01867	.2029	.0021	833.2	1037.8	48.923	6.22	10.48	585.
	55.	2.22518	.2241	.0019	864.7	1090.2	49.922	6.24	10.47	613.
	60.	2.43113	.2452	.0017	896.2	1142.6	50.834	6.27	10.49	640.
	65.	2.63666	.2662	.0016	927.9	1195.1	51.673	6.32	10.52	666.
	70.	2.84187	.2872	.0015	959.9	1247.8	52.455	6.39	10.57	690.
	75.	3.04684	.3081	.0014	992.1	1300.9	53.187	6.47	10.65	712.
	80.	3.25161	.3290	.0013	1024.8	1354.3	53.877	6.56	10.73	734.
	90.	3.66069	.3706	.0011	1091.8	1462.7	55.155	6.80	10.96	773.
	100.	4.06933	.4122	.0010	1161.3	1573.6	56.322	7.07	11.23	809.
	110.	4.47765	.4537	.0009	1233.5	1687.2	57.402	7.36	11.51	842.
	120.	4.88574	.4952	.0008	1308.8	1803.8	58.417	7.66	11.80	873.
	140.	5.70143	.5780	.0007	1467.9	2045.6	60.279	8.22	12.36	932.
	160.	6.51668	.6607	.0006	1637.3	2297.6	61.960	8.70	12.83	987.
	180.	7.33165	.7434	.0006	1815.4	2558.3	63.495	9.09	13.22	1040.
	200.	8.14642	.8260	.0005	2000.5	2825.9	64.905	9.40	13.53	1090.
	220.	8.96105	.9086	.0005	2191.2	3099.2	66.207	9.65	13.78	1139.
	240.	9.77558	.9911	.0004	2386.3	3376.8	67.415	9.85	13.97	1186.
	260.	10.59003	1.0737	.0004	2584.8	3657.9	68.541	9.99	14.12	1232.
	280.	11.40442	1.1563	.0004	2785.9	3941.5	69.591	10.10	14.23	1276.
	300.	12.21788	1.2387	.0003	2989.0	4226.9	70.575	10.18	14.31	1319.
	350.	14.25342	1.4450	.0003	3501.6	4945.8	72.792	10.30	14.43	1423.
	400.	16.28883	1.6513	.0003	4018.1	5668.6	74.722	10.35	14.48	1520.
	450.	18.32416	1.8575	.0002	4536.4	6393.1	76.428	10.37	14.50	1611.
	500.	20.35943	2.0638	.0002	5055.5	7118.4	77.956	10.39	14.51	1698.
	550.	22.39466	2.2700	.0002	5575.2	7844.4	79.340	10.40	14.53	1780.
	600.	24.42987	2.4762	.0002	6096.0	8571.4	80.602	10.42	14.55	1859.
	650.	26.46506	2.6824	.0002	6617.7	9299.2	81.764	10.45	14.57	1934.
	700.	28.50024	2.8887	.0001	7140.9	10028.7	82.852	10.48	14.60	2006.
	750.	30.53540	3.0949	.0001	7666.1	10760.1	83.863	10.52	14.64	2076.
	800.	32.57056	3.3011	.0001	8193.5	11493.7	84.810	10.57	14.69	2142.
	850.	34.60571	3.5073	.0001	8723.6	12230.0	85.702	10.63	14.75	2206.
	900.	36.64086	3.7135	.0001	9256.8	12969.5	86.546	10.70	14.82	2267
	950.	38.67600	3.9197	.0001	9793.5	13712.3	87.348	10.77	14.90	2326.
	1000.	40.71114	4.1259	.0001	10333.9	14459.0	88.114	10.86	14.98	2386.
	1100.	44.78141	4.5384	.0001	11429.3	15966.8	89.540	11.04	15.16	2497.
	1200.	48.85168	4.9508	.0001	12544.2	17494.1	90.861	11.24	15.36	2601.
	1300.	52.92196	5.3632	.0001	13679.8	19042.1	92.100	11.45	15.58	2701.
	1400.	56.99233	5.7756	.0001	14837.2	20611.9	93.270	11.68	15.81	2796.
	1500.	61.06297	6.1881	.0001	16017.2	22204.4	94.383	11.92	16.05	2886.
	1600.	65.13445	6.6005	.0001	17220.5	23820.2	95.419	12.17	16.30	2973.
	1700.	69.20803	7.0129	.0001	18451.0	25463.5	96.410	12.46	16.60	3056.
	1800.	73.28628	7.4253	.0001	19714.9	27140.7	97.368	12.83	16.98	3134.
	2000.	81.47980	8.2501	.0001	22393.8	30649.8	99.226	14.04	18.26	3275.
	2200.	89.80607	9.0750	.0000	25433.9	34533.5	101.067	16.53	20.95	3391.
	2400.	98.47087	9.8998	.0000	29215.1	39192.6	103.086	21.33	26.25	3489.
	2600.	107.86410	10.7247	.0000	34370.5	45299.9	105.525	29.70	35.69	3587.
	2800.	118.63048	11.5495	.0000	41829.7	53849.9	108.692	42.83	50.92	3701.
	3000.	131.72066	12.3743	.0000	52805.4	66152.0	112.936	61.40	73.34	3839.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.101325 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.835	77.0693	621.7	.25638	90.0617	.01026	72.93	255.40	.00053	1.25176	2.2348
14.	76.9227	617.2	.25493	88.0322	.01050	74.61	249.39	.00054	1.25125	2.1659
15.	76.1000	607.3	.24331	79.2241	.01149	83.16	219.56	.00056	1.24835	1.8429
16.	75.1991	610.1	.23205	73.3174	.01217	89.03	195.46	.00057	1.24519	1.6305
17.	74.2514	609.6	.22299	67.6660	.01297	92.88	175.98	.00057	1.24187	1.4978
18.	73.2583	606.7	.21546	62.2852	.01386	95.57	159.94	.00056	1.23840	1.4067
19.	72.2148	598.9	.20898	56.7197	.01494	97.10	146.47	.00054	1.23476	1.3500
20.	71.1057	589.0	.20322	51.3532	.01617	98.44	134.89	.00052	1.23089	1.3051
* 20.268	70.7859	587.9	.20175	50.2056	.01644	98.92	131.98	.00052	1.22978	1.2893
* 20.268	1.3380	189.1	.06667	.0903	.06424	16.94	11.28	.00375	1.00404	.8091
22.	1.2094	208.6	.06721	.0929	.05573	18.07	12.19	.00463	1.00365	.7842
24.	1.0897	231.1	.06739	.0948	.04883	19.50	13.23	.00571	1.00329	.7656
26.	.9936	253.5	.06739	.0961	.04370	20.97	14.24	.00686	1.00300	.7523
28.	.9143	275.7	.06734	.0971	.03967	22.47	15.24	.00809	1.00276	.7418
30.	.8474	297.7	.06728	.0978	.03640	23.97	16.21	.00940	1.00256	.7329
32.	.7901	319.4	.06724	.0984	.03367	25.34	17.16	.01074	1.00238	.7284
34.	.7404	341.0	.06720	.0988	.03136	26.72	18.10	.01215	1.00223	.7242
36.	.6968	362.5	.06716	.0992	.02936	28.11	19.02	.01365	1.00210	.7200
38.	.6582	383.9	.06712	.0995	.02762	29.50	19.91	.01521	1.00198	.7159
40.	.6238	405.2	.06708	.0997	.02609	30.88	20.80	.01686	1.00188	.7119
42.	.5929	426.5	.06704	.0999	.02472	32.25	21.66	.01857	1.00179	.7083
44.	.5650	447.7	.06700	.1001	.02350	33.61	22.51	.02035	1.00170	.7049
46.	.5397	469.0	.06695	.1003	.02240	34.96	23.35	.02220	1.00163	.7017
48.	.5166	490.2	.06689	.1004	.02140	36.29	24.17	.02411	1.00156	.6988
50.	.4954	511.5	.06681	.1005	.02049	37.61	24.98	.02607	1.00149	.6963
55.	.4494	565.2	.06654	.1007	.01853	40.79	26.95	.03120	1.00135	.6919
60.	.4113	619.7	.06614	.1009	.01692	43.86	28.84	.03660	1.00124	.6897
65.	.3793	675.4	.06560	.1010	.01558	47.01	30.68	.04241	1.00114	.6865
70.	.3519	732.6	.06490	.1011	.01443	49.92	32.45	.04830	1.00106	.6874
75.	.3282	791.7	.06407	.1011	.01345	52.87	34.17	.05447	1.00099	.6881
80.	.3075	852.6	.06311	.1012	.01259	55.41	35.85	.06043	1.00093	.6945
90.	.2732	981.4	.06088	.1012	.01117	61.97	39.08	.07452	1.00082	.6911
100.	.2457	1118.3	.05850	.1013	.01004	67.98	42.16	.08871	1.00074	.6962
110.	.2233	1262.8	.05616	.1013	.00912	76.33	44.75	.10689	1.00067	.6749
120.	.2047	1413.6	.05397	.1013	.00835	82.93	47.59	.12357	1.00062	.6773
140.	.1754	1728.2	.05028	.1014	.00715	96.13	53.00	.15966	1.00053	.6814
160.	.1535	2051.9	.04750	.1014	.00625	109.21	58.15	.19967	1.00046	.6832
180.	.1364	2379.3	.04544	.1014	.00556	121.93	63.07	.24340	1.00041	.6839
200.	.1228	2706.5	.04392	.1014	.00500	134.12	67.80	.29066	1.00037	.6841
220.	.1116	3032.6	.04277	.1014	.00454	145.75	72.38	.34114	1.00034	.6845
240.	.1023	3354.7	.04193	.1014	.00417	156.81	76.83	.39489	1.00031	.6847
260.	.0944	3672.6	.04131	.1014	.00385	167.34	81.15	.45177	1.00028	.6848
280.	.0877	3985.9	.04086	.1014	.00357	177.38	85.37	.51176	1.00026	.6848
300.	.0818	4294.7	.04053	.1014	.00333	187.00	89.48	.57475	1.00025	.6848
350.	.0702	5051.0	.04007	.1014	.00286	209.50	99.40	.74515	1.00021	.6845
400.	.0614	5792.3	.03987	.1014	.00250	230.31	108.87	.93297	1.00018	.6843
450.	.0546	6525.4	.03979	.1014	.00222	249.95	117.95	1.13746	1.00016	.6840
500.	.0491	7259.7	.03971	.1014	.00200	268.77	126.70	1.35723	1.00015	.6842
550.	.0447	7993.2	.03966	.1014	.00182	287.04	135.18	1.59281	1.00013	.6842
600.	.0409	8731.1	.03958	.1014	.00167	304.92	143.41	1.84341	1.00012	.6842
650.	.0378	9473.3	.03950	.1014	.00154	322.55	151.41	2.10914	1.00011	.6840
700.	.0351	10225.1	.03937	.1014	.00143	340.02	159.23	2.38898	1.00011	.6838
750.	.0327	10985.5	.03922	.1014	.00133	357.42	166.87	2.68311	1.00010	.6837
800.	.0307	11757.4	.03903	.1014	.00125	374.79	174.35	2.99089	1.00009	.6835
850.	.0289	12542.3	.03882	.1014	.00118	392.17	181.68	3.31187	1.00009	.6834
900.	.0273	13341.4	.03857	.1013	.00111	409.60	188.89	3.64560	1.00008	.6834
950.	.0259	14155.8	.03829	.1013	.00105	427.10	195.97	3.99172	1.00008	.6836
1000.	.0246	14985.9	.03799	.1013	.00100	444.69	202.95	4.34990	1.00007	.6838
1100.	.0223	16683.2	.03737	.1013	.00091	475.56	216.59	5.05595	1.00007	.6906
1200.	.0205	18439.4	.03670	.1013	.00083	511.02	229.87	5.84969	1.00006	.6911
1300.	.0189	20254.9	.03601	.1013	.00077	546.98	242.83	6.68955	1.00006	.6916
1400.	.0175	22130.6	.03531	.1013	.00071	583.55	255.49	7.57531	1.00005	.6920
1500.	.0164	24072.5	.03460	.1013	.00067	621.07	267.89	8.50845	1.00005	.6921
1600.	.0154	26083.1	.03389	.1013	.00062	660.00	280.05	9.49429	1.00005	.6916
1700.	.0144	28217.6	.03310	.1013	.00059	702.43	291.97	10.54428	1.00004	.6899
1800.	.0136	30559.3	.03215	.1013	.00056	751.69	303.68	11.68063	1.00004	.6859
2000.	.0123	36491.4	.02940	.1013	.00050	894.86	326.49	14.37620	1.00004	.6662
2200.	.0111	45963.0	.02503	.1011	.00046	1168.28	345.18	18.02980	1.00003	.6190
2400.	.0102	62506.8	.01949	.1005	.00042	1704.60	367.19	23.02069	1.00003	.5654
2600.	.0093	91052.7	.01415	.0994	.00039	2687.17	389.74	29.23782	1.00003	.5176
2800.	.0084	136993.1	.01002	.0974	.00037	4315.63	413.65	36.19531	1.00003	.4881
3000.	.0076	203993.2	.00725	.0939	.00036	6725.27	439.56	43.48332	1.00002	.4793

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.15 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.851	.01297	1.1717	.9250	218.3	220.2	14.085	4.68	6.38	1264.
	14.	.01299	1.1520	.9249	219.3	221.2	14.156	4.71	6.47	1257.
	15.	.01313	1.0461	.9122	225.9	227.9	14.617	4.92	6.97	1218.
	16.	.01329	.9798	.8942	233.1	235.1	15.082	5.11	7.42	1192.
	17.	.01346	.9161	.8791	240.7	242.8	15.547	5.30	7.89	1168.
	18.	.01364	.8552	.8646	248.9	250.9	16.013	5.46	8.39	1146.
	19.	.01384	.7903	.8493	257.5	259.6	16.480	5.61	8.93	1121.
	20.	.01405	.7272	.8321	266.7	268.8	16.952	5.74	9.50	1097.
*	21.672	.01447	.6202	.7984	283.4	285.6	17.761	5.92	10.58	1053.
*	21.672	.52255	.0673	.0084	644.7	723.1	37.959	6.59	12.84	362.
	22.	.53312	.0692	.0082	647.2	727.2	38.146	6.55	12.67	366.
	24.	.59879	.0807	.0072	661.9	751.7	39.214	6.40	11.95	388.
	26.	.66180	.0914	.0065	675.9	775.2	40.152	6.33	11.55	408.
	28.	.72313	.1015	.0059	689.6	798.0	40.997	6.30	11.30	427.
	30.	.78329	.1113	.0054	703.0	820.4	41.771	6.28	11.13	444.
	32.	.84260	.1209	.0050	716.2	842.6	42.485	6.26	11.00	461.
	34.	.90126	.1302	.0047	729.3	864.4	43.149	6.25	10.90	476.
	36.	.95940	.1394	.0044	742.2	886.2	43.770	6.24	10.82	491.
	38.	1.01714	.1485	.0041	755.2	907.7	44.353	6.24	10.75	506.
	40.	1.07455	.1574	.0039	768.0	929.2	44.903	6.23	10.70	520.
	42.	1.13168	.1663	.0037	780.8	950.6	45.424	6.23	10.66	534.
	44.	1.18858	.1751	.0035	793.6	971.8	45.919	6.23	10.63	547.
	46.	1.24528	.1839	.0034	806.3	993.1	46.391	6.23	10.60	559.
	48.	1.30182	.1926	.0032	819.0	1014.2	46.841	6.23	10.57	572.
	50.	1.35822	.2013	.0031	831.6	1035.4	47.272	6.23	10.56	584.
	55.	1.49870	.2228	.0028	863.3	1088.1	48.278	6.25	10.53	613.
	60.	1.63861	.2441	.0025	894.9	1140.7	49.195	6.28	10.54	640.
	65.	1.77810	.2654	.0023	926.8	1193.5	50.037	6.33	10.56	666.
	70.	1.91727	.2865	.0022	958.8	1246.4	50.822	6.39	10.61	690.
	75.	2.05619	.3075	.0020	991.2	1299.6	51.556	6.47	10.67	712.
	80.	2.19491	.3285	.0019	1023.9	1353.2	52.248	6.56	10.76	734.
	90.	2.47191	.3704	.0017	1091.0	1461.8	53.528	6.80	10.98	773.
	100.	2.74846	.4121	.0015	1160.6	1572.9	54.697	7.07	11.24	809.
	110.	3.02469	.4537	.0014	1232.9	1686.6	55.778	7.37	11.52	843.
	120.	3.30069	.4953	.0013	1308.2	1803.3	56.794	7.66	11.81	874.
	140.	3.85219	.5782	.0011	1467.4	2045.2	58.658	8.22	12.37	933.
	160.	4.40326	.6611	.0009	1636.9	2297.4	60.340	8.70	12.84	988.
	180.	4.95405	.7438	.0008	1815.0	2558.2	61.875	9.09	13.23	1040.
	200.	5.50464	.8265	.0008	2000.2	2825.9	63.286	9.40	13.54	1091.
	220.	6.05509	.9091	.0007	2191.0	3099.2	64.588	9.65	13.79	1139.
	240.	6.60544	.9918	.0006	2386.1	3376.9	65.796	9.85	13.98	1186.
	260.	7.15571	1.0744	.0006	2584.6	3658.0	66.922	9.99	14.12	1232.
	280.	7.70593	1.1569	.0005	2785.8	3941.6	67.972	10.10	14.23	1277.
	300.	8.25551	1.2394	.0005	2988.8	4227.1	68.956	10.18	14.31	1320.
	350.	9.63066	1.4457	.0004	3501.5	4946.1	71.174	10.30	14.43	1423.
	400.	11.00567	1.6520	.0004	4018.0	5668.8	73.104	10.35	14.48	1520.
	450.	12.38060	1.8583	.0003	4536.3	6393.4	74.810	10.37	14.50	1612.
	500.	13.75547	2.0646	.0003	5055.4	7118.7	76.338	10.39	14.51	1698.
	550.	15.13031	2.2708	.0003	5575.2	7844.7	77.722	10.40	14.53	1781.
	600.	16.50512	2.4770	.0003	6096.0	8571.7	78.984	10.42	14.55	1859.
	650.	17.87992	2.6833	.0002	6617.6	9299.6	80.146	10.45	14.57	1935.
	700.	19.25470	2.8895	.0002	7140.9	10029.1	81.234	10.48	14.60	2007.
	750.	20.62947	3.0957	.0002	7666.1	10760.5	82.245	10.52	14.64	2076.
	800.	22.00423	3.3019	.0002	8193.4	11494.1	83.192	10.57	14.69	2143.
	850.	23.37899	3.5082	.0002	8723.6	12230.4	84.084	10.63	14.75	2207.
	900.	24.75374	3.7144	.0002	9256.8	12969.9	84.928	10.70	14.82	2269.
	950.	26.12848	3.9206	.0002	9793.5	13712.7	85.730	10.77	14.90	2328.
	1000.	27.50323	4.1268	.0002	10333.9	14459.4	86.496	10.86	14.98	2386.
	1100.	30.25271	4.5392	.0001	11429.3	15967.2	87.922	11.04	15.16	2497.
	1200.	33.00218	4.9517	.0001	12544.2	17494.5	89.243	11.24	15.36	2602.
	1300.	35.75166	5.3641	.0001	13679.8	19042.5	90.482	11.45	15.58	2701.
	1400.	38.50118	5.7765	.0001	14837.1	20612.3	91.652	11.68	15.80	2796.
	1500.	41.25086	6.1889	.0001	16016.9	22204.5	92.765	11.92	16.04	2886.
	1600.	44.00101	6.6013	.0001	17219.4	23819.5	93.800	12.16	16.29	2973.
	1700.	46.75231	7.0138	.0001	18448.1	25460.9	94.791	12.44	16.57	3057.
	1800.	49.50621	7.4262	.0001	19708.0	27133.9	95.746	12.78	16.92	3136.
	2000.	55.03455	8.2510	.0001	22362.5	30617.7	97.591	13.83	18.04	3279.
	2200.	60.63661	9.0759	.0001	25325.3	34420.8	99.394	15.94	20.31	3400.
	2400.	66.42663	9.9007	.0001	28908.7	38872.7	101.323	19.94	24.72	3501.
	2600.	72.62115	10.7255	.0001	33632.2	44525.4	103.581	26.89	32.53	3599.
	2800.	79.57865	11.5504	.0001	40260.4	52197.2	106.423	37.80	45.11	3708.
	3000.	87.83039	12.3752	.0001	49798.0	62972.6	110.142	53.35	63.69	3839.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.15 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 13.851	77.0972	623.3	.25632	90.3332	.01024	73.13	255.70	.00054	1.25186	2.2314
14.	76.9648	620.0	.25501	88.6598	.01043	74.65	250.26	.00054	1.25139	2.1682
15.	76.1448	609.0	.24371	79.6566	.01145	83.21	220.31	.00056	1.24851	1.8463
16.	75.2472	611.7	.23242	73.7262	.01213	89.11	196.11	.00057	1.24536	1.6328
17.	74.3038	611.3	.22334	68.0668	.01292	92.97	176.57	.00057	1.24206	1.4994
18.	73.3154	608.6	.21579	62.6992	.01379	95.68	160.49	.00056	1.23860	1.4076
19.	72.2760	600.8	.20930	57.1192	.01487	97.23	146.98	.00054	1.23497	1.3504
20.	71.1714	591.1	.20352	51.7551	.01608	98.59	135.36	.00052	1.23112	1.3048
* 21.672	69.1286	568.4	.19499	42.8767	.01862	100.73	118.87	.00050	1.22403	1.2490
* 21.672	1.9137	196.1	.06680	.1287	.06547	18.60	12.17	.00273	1.00578	.8400
22.	1.8757	199.9	.06699	.1299	.06337	18.79	12.34	.00285	1.00566	.8321
24.	1.6700	223.2	.06757	.1348	.05353	20.03	13.36	.00361	1.00504	.7969
26.	1.5110	246.5	.06768	.1381	.04688	21.41	14.36	.00441	1.00456	.7752
28.	1.3829	269.4	.06764	.1404	.04196	22.83	15.35	.00526	1.00417	.7598
30.	1.2767	292.0	.06757	.1421	.03810	24.28	16.31	.00615	1.00385	.7477
32.	1.1868	314.4	.06750	.1434	.03498	25.64	17.26	.00707	1.00358	.7403
34.	1.1096	336.4	.06745	.1445	.03239	27.01	18.19	.00804	1.00335	.7339
36.	1.0423	358.3	.06740	.1453	.03019	28.38	19.10	.00906	1.00314	.7281
38.	.9831	380.0	.06735	.1460	.02829	29.75	20.00	.01013	1.00297	.7228
40.	.9306	401.7	.06730	.1465	.02664	31.12	20.88	.01125	1.00281	.7178
42.	.8836	423.2	.06725	.1470	.02519	32.48	21.74	.01241	1.00266	.7134
44.	.8413	444.7	.06720	.1473	.02389	33.83	22.58	.01362	1.00254	.7094
46.	.8030	466.2	.06714	.1477	.02273	35.17	23.42	.01488	1.00242	.7057
48.	.7682	487.6	.06707	.1479	.02169	36.49	24.24	.01617	1.00232	.7023
50.	.7363	509.1	.06699	.1482	.02074	37.80	25.04	.01751	1.00222	.6994
55.	.6672	563.2	.06670	.1487	.01870	40.97	27.01	.02098	1.00201	.6944
60.	.6103	618.0	.06629	.1490	.01705	44.02	28.90	.02465	1.00184	.6916
65.	.5624	673.9	.06574	.1492	.01567	47.16	30.73	.02859	1.00170	.6880
70.	.5216	731.4	.06503	.1494	.01450	50.06	32.50	.03257	1.00157	.6886
75.	.4863	790.6	.06418	.1496	.01350	52.99	34.22	.03675	1.00147	.6892
80.	.4556	851.7	.06321	.1497	.01263	55.53	35.89	.04078	1.00137	.6954
90.	.4045	980.7	.06097	.1498	.01120	62.09	39.12	.05032	1.00122	.6917
100.	.3638	1117.8	.05858	.1499	.01006	68.08	42.19	.05993	1.00110	.6966
110.	.3306	1262.5	.05623	.1500	.00913	76.37	44.76	.07217	1.00100	.6753
120.	.3030	1413.4	.05403	.1501	.00836	82.97	47.59	.08345	1.00091	.6777
140.	.2596	1728.3	.05032	.1501	.00715	96.16	53.01	.10785	1.00078	.6816
160.	.2271	2052.2	.04754	.1501	.00626	109.24	58.15	.13489	1.00068	.6834
180.	.2019	2379.7	.04548	.1501	.00556	121.95	63.07	.16444	1.00061	.6840
200.	.1817	2707.1	.04395	.1501	.00500	134.14	67.81	.19638	1.00055	.6842
220.	.1652	3033.3	.04280	.1501	.00454	145.77	72.39	.23049	1.00050	.6846
240.	.1514	3355.5	.04195	.1501	.00417	156.83	76.83	.26681	1.00046	.6847
260.	.1397	3673.5	.04133	.1501	.00384	167.35	81.15	.30525	1.00042	.6849
280.	.1298	3986.9	.04087	.1501	.00357	177.40	85.37	.34578	1.00039	.6849
300.	.1211	4295.8	.04054	.1501	.00333	187.01	89.48	.38834	1.00036	.6848
350.	.1038	5052.2	.04008	.1501	.00286	209.51	99.40	.50347	1.00031	.6845
400.	.0909	5793.6	.03988	.1501	.00250	230.32	108.87	.63036	1.00027	.6843
450.	.0808	6526.7	.03980	.1501	.00222	249.96	117.95	.76852	1.00024	.6840
500.	.0727	7261.0	.03972	.1501	.00200	268.78	126.71	.91699	1.00022	.6842
550.	.0661	7994.6	.03967	.1501	.00182	287.04	135.18	1.07614	1.00020	.6842
600.	.0606	8732.5	.03959	.1501	.00167	304.92	143.41	1.24543	1.00018	.6842
650.	.0559	9474.8	.03950	.1501	.00154	322.55	151.41	1.42495	1.00017	.6840
700.	.0519	10226.5	.03938	.1501	.00143	340.03	159.23	1.61399	1.00016	.6838
750.	.0485	10987.0	.03922	.1501	.00133	357.42	166.87	1.81269	1.00015	.6837
800.	.0454	11758.9	.03904	.1501	.00125	374.79	174.35	2.02061	1.00014	.6835
850.	.0428	12543.8	.03882	.1501	.00118	392.18	181.68	2.23745	1.00013	.6834
900.	.0404	13342.9	.03857	.1501	.00111	409.61	188.89	2.46290	1.00012	.6834
950.	.0383	14157.3	.03829	.1501	.00105	427.11	195.97	2.69671	1.00012	.6836
1000.	.0364	14987.5	.03799	.1500	.00100	444.69	202.95	2.93867	1.00011	.6838
1100.	.0331	16684.7	.03737	.1500	.00091	475.56	216.59	3.41561	1.00010	.6906
1200.	.0303	18440.9	.03671	.1500	.00083	511.02	229.87	3.95179	1.00009	.6911
1300.	.0280	20256.0	.03602	.1500	.00077	546.96	242.83	4.51910	1.00008	.6916
1400.	.0260	22130.4	.03532	.1500	.00071	583.48	255.49	5.11727	1.00008	.6920
1500.	.0242	24067.9	.03462	.1500	.00067	620.82	267.90	5.74704	1.00007	.6922
1600.	.0227	26066.6	.03392	.1500	.00062	659.28	280.05	6.41128	1.00007	.6919
1700.	.0214	28172.7	.03317	.1500	.00059	700.60	291.97	7.11629	1.00006	.6905
1800.	.0202	30453.8	.03229	.1500	.00056	747.50	303.67	7.87443	1.00006	.6873
2000.	.0182	36053.5	.02984	.1499	.00050	877.89	326.48	9.64366	1.00005	.6707
2200.	.0165	44580.2	.02594	.1497	.00046	1115.30	345.12	11.98863	1.00005	.6284
2400.	.0151	58946.3	.02082	.1490	.00042	1569.24	367.01	15.18171	1.00005	.5781
2600.	.0138	83268.5	.01558	.1477	.00039	2392.97	389.27	19.23350	1.00004	.5291
2800.	.0126	122213.9	.01128	.1451	.00037	3759.50	412.65	23.87668	1.00004	.4951
3000.	.0114	179472.6	.00823	.1409	.00035	5805.59	437.85	28.82253	1.00003	.4803

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.20 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ KG-K	CP	VELOCITY OF SOUND M/S
* 13.868	.01297	1.1749	.9255	218.3	220.9	14.086	4.68	6.38	1265.
14.	.01299	1.1597	.9255	219.2	221.8	14.149	4.71	6.46	1260.
15.	.01312	1.0513	.9140	225.8	228.4	14.609	4.91	6.97	1221.
16.	.01328	.9847	.8959	233.0	235.6	15.074	5.11	7.41	1195.
17.	.01345	.9209	.8807	240.6	243.3	15.538	5.29	7.88	1171.
18.	.01363	.8603	.8662	248.7	251.4	16.003	5.46	8.38	1149.
19.	.01382	.7953	.8509	257.3	260.1	16.470	5.61	8.92	1124.
20.	.01404	.7323	.8337	266.4	269.3	16.941	5.74	9.48	1100.
22.	.01454	.5995	.7928	286.6	289.5	17.908	5.95	10.82	1044.
* 22.805	.01478	.5396	.7723	295.6	298.5	18.310	6.01	11.52	1017.
* 22.805	.40014	.0661	.0112	647.0	727.1	37.114	6.66	13.55	367.
24.	.43157	.0738	.0102	656.5	742.8	37.785	6.52	12.84	381.
26.	.48170	.0856	.0090	671.4	767.7	38.781	6.40	12.15	403.
28.	.52976	.0966	.0081	685.6	791.6	39.664	6.35	11.74	423.
30.	.57647	.1070	.0074	699.4	814.7	40.465	6.32	11.46	441.
32.	.62222	.1170	.0069	713.0	837.5	41.198	6.29	11.27	458.
34.	.66725	.1268	.0064	726.4	859.8	41.877	6.28	11.12	474.
36.	.71173	.1363	.0060	739.6	882.0	42.509	6.26	11.00	489.
38.	.75578	.1457	.0056	752.7	903.9	43.102	6.25	10.91	504.
40.	.79948	.1549	.0053	765.7	925.6	43.660	6.25	10.84	518.
42.	.84289	.1640	.0050	778.7	947.3	44.187	6.24	10.78	532.
44.	.88607	.1730	.0047	791.6	968.8	44.687	6.24	10.73	546.
46.	.92904	.1819	.0045	804.4	990.2	45.163	6.24	10.69	559.
48.	.97185	.1908	.0043	817.2	1011.6	45.618	6.24	10.66	571.
50.	1.01450	.1996	.0041	830.0	1032.9	46.052	6.24	10.64	583.
55.	1.12063	.2214	.0037	861.8	1085.9	47.064	6.25	10.60	613.
60.	1.22618	.2430	.0034	893.6	1138.9	47.986	6.28	10.59	640.
65.	1.33130	.2645	.0031	925.6	1191.8	48.833	6.33	10.60	666.
70.	1.43610	.2858	.0029	957.7	1244.9	49.620	6.39	10.64	690.
75.	1.54066	.3069	.0027	990.2	1298.3	50.357	6.47	10.70	712.
80.	1.64501	.3281	.0025	1023.0	1352.0	51.050	6.57	10.78	734.
90.	1.85326	.3701	.0022	1090.2	1460.9	52.333	6.80	11.00	774.
100.	2.06107	.4120	.0020	1159.9	1572.1	53.504	7.07	11.26	810.
110.	2.26855	.4537	.0018	1232.3	1686.0	54.586	7.37	11.54	843.
120.	2.47580	.4954	.0017	1307.7	1802.8	55.603	7.66	11.82	874.
140.	2.88982	.5785	.0014	1466.9	2044.9	57.468	8.22	12.37	933.
160.	3.30341	.6615	.0013	1636.5	2297.2	59.151	8.70	12.84	988.
180.	3.71671	.7443	.0011	1814.7	2558.1	60.687	9.09	13.23	1041.
200.	4.12982	.8270	.0010	1999.9	2825.9	62.098	9.40	13.54	1091.
220.	4.54279	.9097	.0009	2190.7	3099.3	63.400	9.65	13.79	1140.
240.	4.95565	.9924	.0008	2385.9	3377.0	64.609	9.85	13.98	1187.
260.	5.36844	1.0750	.0008	2584.4	3658.1	65.735	9.99	14.13	1233.
280.	5.78117	1.1576	.0007	2785.6	3941.8	66.785	10.10	14.23	1277.
300.	6.19343	1.2401	.0007	2988.7	4227.3	67.769	10.19	14.31	1320.
350.	7.22489	1.4465	.0006	3501.3	4946.3	69.987	10.30	14.43	1423.
400.	8.25622	1.6528	.0005	4017.9	5669.1	71.917	10.35	14.48	1520.
450.	9.28747	1.8591	.0004	4536.2	6393.7	73.624	10.37	14.50	1612.
500.	10.31867	2.0654	.0004	5055.4	7119.1	75.151	10.39	14.52	1699.
550.	11.34982	2.2716	.0004	5575.1	7845.1	76.536	10.40	14.53	1781.
600.	12.38096	2.4779	.0003	6095.9	8572.1	77.798	10.42	14.55	1860.
650.	13.41207	2.6841	.0003	6617.6	9300.0	78.960	10.45	14.57	1935.
700.	14.44317	2.8904	.0003	7140.8	10029.5	80.048	10.48	14.60	2007.
750.	15.47426	3.0966	.0003	7666.1	10760.9	81.058	10.52	14.64	2076.
800.	16.50534	3.3028	.0003	8193.4	11494.5	82.006	10.57	14.69	2143.
850.	17.53642	3.5090	.0002	8723.6	12230.8	82.898	10.63	14.75	2207.
900.	18.56749	3.7152	.0002	9256.8	12970.3	83.742	10.70	14.82	2269.
950.	19.59855	3.9215	.0002	9793.4	13713.1	84.544	10.77	14.90	2329.
1000.	20.62962	4.1277	.0002	10333.9	14459.8	85.309	10.86	14.98	2386.
1100.	22.69174	4.5401	.0002	11429.3	15967.6	86.735	11.04	15.16	2497.
1200.	24.75385	4.9525	.0002	12544.1	17494.9	88.057	11.24	15.36	2602.
1300.	26.81596	5.3650	.0002	13679.7	19042.9	89.295	11.45	15.58	2701.
1400.	28.87810	5.7774	.0001	14837.0	20612.6	90.466	11.68	15.80	2796.
1500.	30.94034	6.1898	.0001	16016.7	22204.7	91.578	11.91	16.04	2887.
1600.	33.00288	6.6022	.0001	17218.7	23819.3	92.613	12.15	16.28	2974.
1700.	35.06618	7.0147	.0001	18446.3	25459.6	93.603	12.42	16.55	3057.
1800.	37.13116	7.4271	.0001	19703.7	27130.0	94.557	12.74	16.88	3137.
2000.	41.27447	8.2519	.0001	22343.1	30598.0	96.393	13.71	17.90	3282.
2200.	45.46565	9.0768	.0001	25258.2	34351.3	98.173	15.57	19.91	3406.
2400.	49.77894	9.9016	.0001	28719.3	38675.0	100.047	19.09	23.77	3510.
2600.	54.35499	10.7264	.0001	33175.7	44046.7	102.193	25.15	30.57	3608.
2800.	59.42684	11.5513	.0001	39289.7	51175.0	104.834	34.67	41.51	3715.
3000.	65.34074	12.3761	.0001	47934.6	61002.7	108.228	48.29	57.68	3840.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.20 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.868	77.1259	624.9	.25626	90.6124	.01021	73.34	256.01	.00054	1.25196	2.2280
14.	77.0078	622.9	.25509	89.3027	.01036	74.69	251.16	.00054	1.25155	2.1706
15.	76.1907	610.6	.24412	80.0995	.01141	83.27	221.08	.00056	1.24867	1.8499
16.	75.2962	613.4	.23280	74.1448	.01208	89.19	196.79	.00058	1.24553	1.6353
17.	74.3574	613.0	.22370	68.4766	.01286	93.07	177.19	.00057	1.24224	1.5011
18.	73.3736	610.5	.21613	63.1221	.01372	95.80	161.05	.00056	1.23880	1.4085
19.	72.3384	602.9	.20963	57.5276	.01479	97.37	147.49	.00054	1.23519	1.3509
20.	71.2386	593.3	.20383	52.1662	.01598	98.74	135.84	.00053	1.23136	1.3046
22.	68.7873	563.1	.19370	41.2384	.01923	101.10	116.47	.00049	1.22284	1.2470
* 22.805	67.6762	544.6	.18973	36.5158	.02115	101.19	109.69	.00047	1.21900	1.2487
* 22.805	2.4991	200.5	.06703	.1652	.06756	20.08	12.91	.00214	1.00755	.8711
24.	2.3171	215.0	.06761	.1710	.05973	20.69	13.51	.00250	1.00700	.8382
26.	2.0760	239.1	.06793	.1778	.05079	21.92	14.50	.00313	1.00627	.8033
28.	1.8876	262.9	.06793	.1823	.04464	23.25	15.47	.00378	1.00570	.7808
30.	1.7347	286.3	.06785	.1856	.04005	24.63	16.43	.00446	1.00524	.7645
32.	1.6072	309.2	.06777	.1881	.03645	25.97	17.37	.00516	1.00485	.7535
34.	1.4987	331.7	.06771	.1900	.03352	27.31	18.29	.00590	1.00452	.7446
36.	1.4050	354.0	.06766	.1915	.03108	28.66	19.19	.00667	1.00424	.7369
38.	1.3231	376.1	.06760	.1927	.02902	30.02	20.08	.00748	1.00399	.7302
40.	1.2508	398.1	.06753	.1937	.02723	31.38	20.96	.00833	1.00377	.7242
42.	1.1864	419.9	.06748	.1946	.02568	32.72	21.82	.00921	1.00358	.7189
44.	1.1286	441.7	.06741	.1953	.02430	34.06	22.66	.01012	1.00340	.7142
46.	1.0764	463.4	.06734	.1958	.02308	35.39	23.49	.01107	1.00325	.7099
48.	1.0290	485.0	.06727	.1963	.02198	36.70	24.31	.01204	1.00310	.7060
50.	.9857	506.7	.06717	.1968	.02099	38.00	25.11	.01305	1.00297	.7027
55.	.8924	561.2	.06686	.1976	.01888	41.16	27.07	.01567	1.00269	.6969
60.	.8155	616.3	.06644	.1982	.01718	44.19	28.95	.01843	1.00246	.6936
65.	.7511	672.5	.06587	.1986	.01577	47.32	30.78	.02139	1.00226	.6895
70.	.6963	730.1	.06515	.1990	.01458	50.21	32.55	.02439	1.00210	.6898
75.	.6491	789.5	.06430	.1992	.01356	53.13	34.26	.02753	1.00196	.6903
80.	.6079	850.8	.06332	.1994	.01268	55.66	35.93	.03056	1.00183	.6963
90.	.5396	980.0	.06106	.1997	.01122	62.21	39.15	.03773	1.00163	.6923
100.	.4852	1117.3	.05867	.1999	.01007	68.19	42.23	.04495	1.00146	.6970
110.	.4408	1262.2	.05630	.2000	.00914	76.42	44.77	.05410	1.00133	.6758
120.	.4039	1413.2	.05409	.2001	.00837	83.01	47.60	.06257	1.00122	.6781
140.	.3460	1728.4	.05037	.2002	.00716	96.19	53.01	.08088	1.00104	.6819
160.	.3027	2052.4	.04758	.2002	.00626	109.26	58.15	.10118	1.00091	.6835
180.	.2691	2380.2	.04551	.2003	.00556	121.97	63.07	.12335	1.00081	.6842
200.	.2421	2707.7	.04398	.2003	.00500	134.16	67.81	.14732	1.00073	.6843
220.	.2201	3034.0	.04282	.2003	.00454	145.78	72.39	.17291	1.00066	.6847
240.	.2018	3356.4	.04197	.2003	.00417	156.84	76.83	.20016	1.00061	.6848
260.	.1863	3674.5	.04135	.2002	.00384	167.37	81.15	.22899	1.00056	.6849
280.	.1730	3987.9	.04089	.2002	.00357	177.41	85.37	.25940	1.00052	.6849
300.	.1615	4296.9	.04056	.2002	.00333	187.02	89.49	.29133	1.00049	.6849
350.	.1384	5053.5	.04009	.2002	.00286	209.52	99.41	.37769	1.00042	.6845
400.	.1211	5794.9	.03989	.2002	.00250	230.33	108.87	.47288	1.00036	.6843
450.	.1077	6528.1	.03981	.2002	.00222	249.96	117.95	.57651	1.00032	.6841
500.	.0969	7262.4	.03973	.2002	.00200	268.79	126.71	.68788	1.00029	.6842
550.	.0881	7996.1	.03967	.2001	.00182	287.05	135.18	.80725	1.00027	.6842
600.	.0808	8733.9	.03960	.2001	.00167	304.93	143.41	.93424	1.00024	.6842
650.	.0746	9476.2	.03951	.2001	.00154	322.56	151.42	1.05888	1.00022	.6840
700.	.0692	10228.0	.03938	.2001	.00143	340.03	159.23	1.21068	1.00021	.6838
750.	.0646	10988.5	.03923	.2001	.00133	357.43	166.87	1.35972	1.00019	.6837
800.	.0606	11760.4	.03904	.2001	.00125	374.80	174.35	1.51567	1.00018	.6835
850.	.0570	12545.3	.03883	.2001	.00118	392.18	181.69	1.67830	1.00017	.6834
900.	.0539	13344.5	.03858	.2001	.00111	409.61	188.89	1.84740	1.00016	.6834
950.	.0510	14158.9	.03830	.2001	.00105	427.11	195.97	2.02277	1.00015	.6836
1000.	.0485	14989.1	.03800	.2001	.00100	444.70	202.95	2.20425	1.00015	.6838
1100.	.0441	16686.3	.03737	.2001	.00091	475.56	216.59	2.55195	1.00013	.6906
1200.	.0404	18442.5	.03671	.2001	.00083	511.02	229.87	2.96410	1.00012	.6911
1300.	.0373	20257.4	.03602	.2001	.00077	546.95	242.83	3.38957	1.00011	.6916
1400.	.0346	22130.9	.03533	.2001	.00071	583.43	255.49	3.83814	1.00010	.6920
1500.	.0323	24065.7	.03463	.2001	.00067	620.67	267.90	4.31020	1.00010	.6923
1600.	.0303	26057.1	.03394	.2001	.00062	658.83	280.05	4.80761	1.00009	.6921
1700.	.0285	28145.7	.03321	.2000	.00059	699.47	291.97	5.33439	1.00009	.6909
1800.	.0269	30389.4	.03238	.2000	.00056	744.92	303.67	5.89858	1.00008	.6882
2000.	.0242	35783.4	.03011	.1999	.00050	867.40	326.47	7.20098	1.00007	.6737
2200.	.0220	43725.4	.02654	.1996	.00046	1082.52	345.09	8.89869	1.00007	.6347
2400.	.0201	56740.8	.02173	.1989	.00042	1485.36	366.90	11.19760	1.00006	.5872
2600.	.0184	78429.0	.01662	.1973	.00039	2210.00	388.97	14.14545	1.00006	.5381
2800.	.0168	112956.3	.01224	.1944	.00037	3411.05	411.99	17.58074	1.00005	.5013
3000.	.0153	163878.2	.00902	.1894	.00035	5220.51	436.69	21.28967	1.00005	.4825

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.25 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.885	.01296	1.1781	.9261	218.3	221.6	14.087	4.69	6.38	1267.
	14.	.01298	1.1673	.9261	219.1	222.3	14.142	4.71	6.44	1264.
	15.	.01312	1.0565	.9158	225.7	229.0	14.602	4.91	6.96	1224.
	16.	.01327	.9896	.8975	232.9	236.2	15.066	5.11	7.40	1197.
	17.	.01344	.9257	.8824	240.5	243.8	15.530	5.29	7.87	1174.
	18.	.01362	.8653	.8678	248.5	251.9	15.994	5.46	8.37	1151.
	19.	.01381	.8002	.8526	257.1	260.6	16.460	5.61	8.90	1127.
	20.	.01402	.7373	.8354	266.2	269.7	16.930	5.74	9.46	1103.
	22.	.01452	.6051	.7946	286.3	289.9	17.894	5.95	10.79	1048.
*	23.751	.01507	.4836	.7464	306.3	310.1	18.776	6.08	12.29	989.
*	23.751	.32422	.0645	.0140	648.3	729.4	36.440	6.73	14.28	370.
	24.	.32992	.0663	.0137	650.4	732.9	36.588	6.69	14.05	373.
	26.	.37292	.0795	.0119	666.5	759.7	37.659	6.49	12.87	397.
	28.	.41331	.0914	.0106	681.4	784.8	38.587	6.40	12.24	418.
	30.	.45210	.1026	.0096	695.8	808.8	39.418	6.36	11.84	437.
	32.	.48980	.1131	.0088	709.8	832.2	40.173	6.33	11.57	455.
	34.	.52671	.1233	.0081	723.4	855.1	40.868	6.30	11.36	471.
	36.	.56303	.1332	.0076	736.9	877.7	41.513	6.28	11.20	487.
	38.	.59889	.1429	.0071	750.2	900.0	42.115	6.27	11.08	502.
	40.	.63439	.1523	.0067	763.4	922.0	42.681	6.26	10.99	517.
	42.	.66959	.1617	.0063	776.5	943.9	43.215	6.25	10.91	531.
	44.	.70454	.1709	.0060	789.6	965.7	43.721	6.25	10.85	545.
	46.	.73928	.1800	.0057	802.5	987.3	44.202	6.25	10.79	558.
	48.	.77385	.1890	.0054	815.4	1008.9	44.660	6.24	10.75	570.
	50.	.80827	.1980	.0052	828.3	1030.3	45.098	6.25	10.72	583.
	55.	.89379	.2201	.0047	860.3	1083.7	46.117	6.26	10.66	612.
	60.	.97873	.2419	.0043	892.3	1137.0	47.044	6.29	10.64	640.
	65.	1.06323	.2636	.0039	924.4	1190.2	47.894	6.33	10.64	666.
	70.	1.14741	.2850	.0036	956.6	1243.5	48.684	6.40	10.68	690.
	75.	1.23134	.3064	.0034	989.1	1297.0	49.423	6.47	10.73	713.
	80.	1.31507	.3276	.0032	1022.1	1350.9	50.118	6.57	10.81	734.
	90.	1.48207	.3699	.0028	1089.4	1459.9	51.404	6.80	11.02	774.
	100.	1.64864	.4119	.0025	1159.2	1571.3	52.577	7.08	11.27	810.
	110.	1.81487	.4538	.0023	1231.7	1685.4	53.660	7.37	11.55	843.
	120.	1.98088	.4955	.0021	1307.1	1802.3	54.678	7.66	11.84	875.
	140.	2.31241	.5788	.0018	1466.5	2044.6	56.545	8.22	12.38	933.
	160.	2.64350	.6618	.0016	1636.1	2297.0	58.228	8.70	12.85	989.
	180.	2.97431	.7448	.0014	1814.4	2558.0	59.765	9.09	13.23	1041.
	200.	3.30493	.8276	.0013	1999.6	2825.8	61.176	9.40	13.54	1092.
	220.	3.63540	.9103	.0011	2190.4	3099.3	62.479	9.66	13.79	1140.
	240.	3.96578	.9930	.0010	2385.7	3377.1	63.688	9.85	13.98	1187.
	260.	4.29608	1.0757	.0010	2584.2	3658.3	64.813	10.00	14.13	1233.
	280.	4.62632	1.1583	.0009	2785.4	3942.0	65.864	10.11	14.24	1277.
	300.	4.95618	1.2408	.0008	2988.5	4227.5	66.849	10.19	14.31	1321.
	350.	5.78144	1.4473	.0007	3501.2	4946.6	69.066	10.30	14.43	1424.
	400.	6.60656	1.6536	.0006	4017.8	5669.4	70.997	10.35	14.48	1521.
	450.	7.43160	1.8599	.0006	4536.2	6394.1	72.703	10.37	14.50	1612.
	500.	8.25658	2.0662	.0005	5055.3	7119.4	74.231	10.39	14.52	1699.
	550.	9.08153	2.2725	.0005	5575.0	7845.4	75.615	10.40	14.53	1781.
	600.	9.90646	2.4787	.0004	6095.9	8572.5	76.877	10.42	14.55	1860.
	650.	10.73136	2.6850	.0004	6617.5	9300.4	78.039	10.45	14.57	1935.
	700.	11.55625	2.8912	.0004	7140.8	10029.9	79.127	10.48	14.60	2007.
	750.	12.38114	3.0974	.0003	7666.0	10761.3	80.138	10.52	14.64	2076.
	800.	13.20601	3.3037	.0003	8193.4	11494.9	81.085	10.57	14.69	2143.
	850.	14.03088	3.5099	.0003	8723.5	12231.3	81.977	10.63	14.75	2207.
	900.	14.85574	3.7161	.0003	9256.8	12970.7	82.821	10.70	14.82	2269.
	950.	15.68060	3.9223	.0003	9793.4	13713.6	83.624	10.77	14.90	2329.
	1000.	16.50545	4.1286	.0003	10333.9	14460.2	84.389	10.86	14.98	2387.
	1100.	18.15515	4.5410	.0002	11429.3	15968.1	85.815	11.04	15.16	2497.
	1200.	19.80485	4.9534	.0002	12544.1	17495.3	87.136	11.24	15.36	2602.
	1300.	21.45454	5.3659	.0002	13679.7	19043.4	88.375	11.45	15.58	2701.
	1400.	23.10426	5.7783	.0002	14837.0	20613.0	89.545	11.68	15.80	2796.
	1500.	24.75404	6.1907	.0002	16016.5	22205.0	90.658	11.91	16.04	2887.
	1600.	26.40404	6.6031	.0002	17218.3	23819.3	91.693	12.15	16.28	2974.
	1700.	28.05457	7.0155	.0001	18445.1	25458.8	92.682	12.41	16.54	3058.
	1800.	29.70632	7.4280	.0001	19700.8	27127.4	93.635	12.72	16.86	3138.
	2000.	33.01935	8.2528	.0001	22329.8	30584.7	95.466	13.62	17.80	3284.
	2200.	36.36665	9.0776	.0001	25212.4	34304.0	97.229	15.33	19.64	3410.
	2400.	39.80132	9.9025	.0001	28590.0	38540.3	99.065	18.50	23.13	3517.
	2600.	43.42403	10.7273	.0001	32864.2	43720.2	101.135	23.96	29.24	3615.
	2800.	47.40161	11.5522	.0001	38627.0	50477.4	103.639	32.52	39.05	3720.
	3000.	51.98234	12.3770	.0001	46661.3	59656.9	106.810	44.80	53.57	3842.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.25 MPA ISOBAR

	TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
*	13.885	77.1545	626.5	.25619	90.8919	.01019	73.55	256.32	.00054	1.25206	2.2246
	14.	77.0506	625.7	.25517	89.9438	.01030	74.73	252.05	.00054	1.25170	2.1731
	15.	76.2363	612.3	.24452	80.5409	.01137	83.33	221.85	.00057	1.24883	1.8534
	16.	75.3451	615.0	.23317	74.5620	.01204	89.26	197.46	.00058	1.24571	1.6377
	17.	74.4107	614.8	.22406	68.8847	.01281	93.17	177.80	.00057	1.24243	1.5028
	18.	73.4314	612.5	.21646	63.5428	.01366	95.92	161.61	.00056	1.23901	1.4095
	19.	72.4005	604.9	.20995	57.9339	.01472	97.50	148.01	.00054	1.23541	1.3513
	20.	71.3054	595.5	.20413	52.5755	.01589	98.89	136.31	.00053	1.23159	1.3043
	22.	68.8698	565.8	.19399	41.6725	.01907	101.30	116.92	.00049	1.22313	1.2452
*	23.751	66.3708	528.4	.18510	32.0971	.02325	100.98	102.75	.00045	1.21449	1.2501
*	23.751	3.0843	203.3	.06730	.1988	.07022	21.43	13.56	.00175	1.00932	.9030
	24.	3.0310	206.5	.06747	.2009	.06806	21.52	13.68	.00182	1.00916	.8930
	26.	2.6816	231.6	.06813	.2132	.05558	22.50	14.64	.00235	1.00810	.8375
	28.	2.4195	256.3	.06821	.2212	.04776	23.71	15.60	.00288	1.00731	.8051
	30.	2.2119	280.4	.06813	.2268	.04223	25.01	16.54	.00344	1.00668	.7833
	32.	2.0417	304.0	.06804	.2310	.03804	26.32	17.47	.00401	1.00616	.7679
	34.	1.8986	327.0	.06796	.2341	.03473	27.63	18.39	.00461	1.00573	.7560
	36.	1.7761	349.7	.06791	.2366	.03203	28.96	19.29	.00524	1.00536	.7462
	38.	1.6697	372.2	.06784	.2385	.02978	30.30	20.17	.00589	1.00504	.7379
	40.	1.5763	394.5	.06777	.2401	.02785	31.64	21.04	.00658	1.00476	.7307
	42.	1.4935	416.6	.06770	.2415	.02618	32.97	21.90	.00728	1.00451	.7246
	44.	1.4194	438.6	.06762	.2426	.02473	34.29	22.74	.00802	1.00428	.7191
	46.	1.3527	460.6	.06754	.2435	.02344	35.61	23.56	.00878	1.00408	.7142
	48.	1.2922	482.4	.06746	.2443	.02228	36.92	24.38	.00957	1.00390	.7098
	50.	1.2372	504.3	.06736	.2450	.02125	38.21	25.18	.01038	1.00373	.7061
	55.	1.1188	559.2	.06703	.2463	.01906	41.34	27.13	.01248	1.00337	.6994
	60.	1.0217	614.6	.06659	.2472	.01731	44.36	29.01	.01469	1.00308	.6956
	65.	.9405	671.0	.06601	.2479	.01586	47.48	30.83	.01708	1.00284	.6911
	70.	.8715	728.9	.06528	.2484	.01465	50.36	32.59	.01948	1.00263	.6911
	75.	.8121	788.4	.06442	.2488	.01361	53.26	34.31	.02200	1.00245	.6915
	80.	.7604	849.8	.06343	.2491	.01272	55.78	35.98	.02443	1.00229	.6972
	90.	.6747	979.3	.06116	.2496	.01125	62.32	39.19	.03018	1.00203	.6929
	100.	.6066	1116.8	.05875	.2498	.01009	68.30	42.26	.03597	1.00183	.6974
	110.	.5510	1261.9	.05637	.2500	.00915	76.46	44.77	.04326	1.00166	.6763
	120.	.5048	1413.1	.05415	.2502	.00838	83.05	47.61	.05004	1.00152	.6785
	140.	.4324	1728.4	.05042	.2503	.00716	96.23	53.02	.06470	1.00130	.6822
	160.	.3783	2052.7	.04762	.2504	.00626	109.29	58.16	.08095	1.00114	.6837
	180.	.3362	2380.6	.04554	.2504	.00556	121.99	63.08	.09870	1.00101	.6843
	200.	.3026	2708.3	.04400	.2504	.00500	134.18	67.81	.11788	1.00091	.6845
	220.	.2751	3034.8	.04285	.2504	.00454	145.80	72.39	.13836	1.00083	.6847
	240.	.2522	3357.2	.04199	.2504	.00416	156.86	76.84	.16017	1.00076	.6849
	260.	.2328	3675.4	.04137	.2504	.00384	167.38	81.16	.18324	1.00070	.6850
	280.	.2162	3989.0	.04091	.2504	.00357	177.42	85.37	.20757	1.00065	.6850
	300.	.2018	4298.0	.04057	.2504	.00333	187.04	89.49	.23312	1.00061	.6849
	350.	.1730	5054.7	.04010	.2503	.00285	209.52	99.41	.30223	1.00052	.6846
	400.	.1514	5796.2	.03990	.2503	.00250	230.33	108.87	.37839	1.00046	.6843
	450.	.1346	6529.4	.03982	.2503	.00222	249.97	117.95	.46131	1.00041	.6841
	500.	.1211	7263.8	.03974	.2503	.00200	268.79	126.71	.55041	1.00036	.6843
	550.	.1101	7997.5	.03968	.2502	.00182	287.05	135.18	.64592	1.00033	.6842
	600.	.1009	8735.4	.03961	.2502	.00167	304.93	143.41	.74752	1.00030	.6842
	650.	.0932	9477.7	.03952	.2502	.00154	322.56	151.42	.85525	1.00028	.6840
	700.	.0865	10229.5	.03939	.2502	.00143	340.04	159.23	.96869	1.00026	.6838
	750.	.0808	10990.0	.03924	.2502	.00133	357.43	166.87	1.08793	1.00024	.6837
	800.	.0757	11761.9	.03905	.2502	.00125	374.80	174.35	1.21270	1.00023	.6835
	850.	.0713	12546.9	.03883	.2502	.00118	392.18	181.69	1.34281	1.00021	.6834
	900.	.0673	13346.0	.03858	.2501	.00111	409.61	188.89	1.47810	1.00020	.6834
	950.	.0638	14160.4	.03830	.2501	.00105	427.11	195.98	1.61840	1.00019	.6836
	1000.	.0606	14990.6	.03800	.2501	.00100	444.70	202.95	1.76359	1.00018	.6838
	1100.	.0551	16687.9	.03738	.2501	.00091	475.56	216.59	2.04975	1.00017	.6906
	1200.	.0505	18444.1	.03671	.2501	.00083	511.02	229.87	2.37148	1.00015	.6911
	1300.	.0466	20258.9	.03602	.2501	.00077	546.95	242.83	2.71186	1.00014	.6916
	1400.	.0433	22131.9	.03533	.2501	.00071	583.40	255.49	3.07069	1.00013	.6921
	1500.	.0404	24064.8	.03463	.2501	.00067	620.56	267.90	3.44820	1.00012	.6923
	1600.	.0379	26051.2	.03396	.2501	.00062	658.53	280.05	3.84570	1.00011	.6922
	1700.	.0356	28127.8	.03324	.2501	.00059	698.70	291.97	4.26604	1.00011	.6912
	1800.	.0337	30346.0	.03244	.2500	.00056	743.15	303.67	4.71498	1.00010	.6888
	2000.	.0303	35599.7	.03030	.2499	.00050	860.23	326.47	5.74331	1.00009	.6757
	2200.	.0275	43142.4	.02696	.2496	.00046	1060.14	345.06	7.06668	1.00008	.6393
	2400.	.0251	55234.1	.02241	.2488	.00042	1428.04	366.82	8.84807	1.00008	.5940
	2600.	.0230	75114.7	.01743	.2470	.00039	2084.67	388.77	11.14652	1.00007	.5452
	2800.	.0211	106586.3	.01301	.2437	.00037	3171.23	411.54	13.85831	1.00006	.5068
	3000.	.0192	153046.9	.00967	.2381	.00035	4814.04	435.85	16.81836	1.00006	.4850

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.30 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.901	.01296	1.1812	.9267	218.3	222.2	14.088	4.69	6.38	1268.
14.	.01297	1.1750	.9266	219.0	222.9	14.136	4.71	6.43	1267.
15.	.01311	1.0616	.9176	225.6	229.5	14.595	4.91	6.96	1226.
16.	.01326	.9945	.8992	232.7	236.7	15.059	5.11	7.40	1200.
17.	.01343	.9305	.8840	240.3	244.4	15.521	5.29	7.86	1176.
18.	.01361	.8704	.8694	248.4	252.5	15.985	5.46	8.35	1154.
19.	.01380	.8051	.8542	256.9	261.1	16.450	5.61	8.89	1130.
20.	.01401	.7424	.8370	266.0	270.2	16.919	5.74	9.44	1105.
22.	.01450	.6106	.7964	286.0	290.4	17.880	5.95	10.75	1051.
24.	.01513	.4708	.7406	309.0	313.5	18.888	6.09	12.49	983.
* 24.571	.01535	.4345	.7207	316.2	320.8	19.188	6.12	13.04	962.
* 24.571	.27220	.0625	.0168	648.8	730.5	35.872	6.78	15.05	372.
26.	.29965	.0730	.0150	661.2	751.1	36.684	6.59	13.80	391.
28.	.33525	.0861	.0132	677.0	777.6	37.667	6.47	12.84	413.
30.	.36892	.0980	.0119	692.0	802.7	38.533	6.40	12.27	433.
32.	.40135	.1091	.0108	706.4	826.8	39.312	6.36	11.89	452.
34.	.43291	.1198	.0100	720.4	850.3	40.024	6.33	11.62	469.
36.	.46382	.1300	.0093	734.2	873.3	40.683	6.30	11.41	485.
38.	.49425	.1400	.0087	747.7	896.0	41.296	6.29	11.26	501.
40.	.52429	.1498	.0081	761.1	918.4	41.870	6.27	11.14	516.
42.	.55403	.1593	.0077	774.4	940.6	42.411	6.27	11.04	530.
44.	.58350	.1688	.0073	787.5	962.6	42.922	6.26	10.96	544.
46.	.61277	.1781	.0069	800.6	984.4	43.408	6.26	10.90	557.
48.	.64185	.1873	.0066	813.6	1006.2	43.871	6.25	10.84	570.
50.	.67078	.1964	.0063	826.6	1027.8	44.312	6.25	10.80	582.
55.	.74257	.2188	.0057	858.8	1081.6	45.338	6.27	10.72	612.
60.	.81376	.2409	.0052	891.0	1135.1	46.270	6.29	10.69	640.
65.	.88453	.2627	.0047	923.2	1188.5	47.123	6.34	10.69	666.
70.	.95496	.2843	.0044	955.5	1242.0	47.917	6.40	10.71	690.
75.	1.02514	.3058	.0041	988.1	1295.7	48.658	6.48	10.76	713.
80.	1.09512	.3272	.0038	1021.2	1349.7	49.355	6.57	10.84	734.
90.	1.23463	.3696	.0034	1088.6	1459.0	50.643	6.81	11.04	774.
100.	1.37369	.4118	.0030	1158.5	1570.6	51.818	7.08	11.29	810.
110.	1.51243	.4538	.0027	1231.0	1684.8	52.903	7.37	11.56	844.
120.	1.65094	.4956	.0025	1306.5	1801.8	53.921	7.67	11.85	875.
140.	1.92747	.5791	.0022	1466.0	2044.3	55.789	8.22	12.39	934.
160.	2.20356	.6622	.0019	1635.7	2296.8	57.474	8.70	12.85	989.
180.	2.47938	.7452	.0017	1814.0	2557.9	59.011	9.09	13.24	1042.
200.	2.75500	.8281	.0015	1999.3	2825.8	60.422	9.40	13.55	1092.
220.	3.03048	.9109	.0014	2190.2	3099.3	61.726	9.66	13.79	1141.
240.	3.30587	.9937	.0013	2385.4	3377.2	62.935	9.85	13.98	1188.
260.	3.58117	1.0763	.0012	2584.0	3658.4	64.061	10.00	14.13	1233.
280.	3.85642	1.1590	.0011	2785.2	3942.1	65.112	10.11	14.24	1278.
300.	4.13135	1.2416	.0010	2988.3	4227.8	66.096	10.19	14.32	1321.
350.	4.81913	1.4480	.0009	3501.1	4946.8	68.314	10.30	14.43	1424.
400.	5.50678	1.6544	.0008	4017.7	5669.7	70.245	10.35	14.48	1521.
450.	6.19435	1.8607	.0007	4536.1	6394.4	71.951	10.37	14.50	1613.
500.	6.88186	2.0670	.0006	5055.2	7119.8	73.479	10.39	14.52	1699.
550.	7.56934	2.2733	.0005	5575.0	7845.8	74.863	10.40	14.53	1782.
600.	8.25679	2.4796	.0005	6095.8	8572.9	76.125	10.42	14.55	1860.
650.	8.94422	2.6858	.0005	6617.5	9300.8	77.287	10.45	14.57	1936.
700.	9.63164	2.8921	.0004	7140.8	10030.3	78.375	10.48	14.60	2008.
750.	10.31905	3.0983	.0004	7666.0	10761.7	79.386	10.52	14.64	2077.
800.	11.00645	3.3045	.0004	8193.4	11495.3	80.333	10.57	14.69	2143.
850.	11.69385	3.5108	.0004	8723.5	12231.7	81.225	10.63	14.75	2208.
900.	12.38124	3.7170	.0003	9256.7	12971.1	82.069	10.70	14.82	2269.
950.	13.06862	3.9232	.0003	9793.4	13714.0	82.872	10.77	14.90	2329.
1000.	13.75601	4.1294	.0003	10333.8	14460.6	83.637	10.86	14.98	2387.
1100.	15.13076	4.5419	.0003	11429.3	15968.5	85.063	11.04	15.16	2498.
1200.	16.50551	4.9543	.0003	12544.1	17495.8	86.384	11.24	15.36	2602.
1300.	17.88026	5.3667	.0002	13679.7	19043.8	87.623	11.45	15.58	2702.
1400.	19.25502	5.7792	.0002	14836.9	20613.4	88.793	11.68	15.80	2796.
1500.	20.62984	6.1916	.0002	16016.4	22205.3	89.906	11.91	16.04	2887.
1600.	22.00482	6.6040	.0002	17217.9	23819.4	90.940	12.15	16.27	2974.
1700.	23.38020	7.0164	.0002	18444.2	25458.3	91.929	12.40	16.53	3058.
1800.	24.75651	7.4289	.0002	19698.7	27125.6	92.881	12.70	16.84	3138.
2000.	27.51638	8.2537	.0002	22320.1	30575.0	94.708	13.56	17.73	3286.
2200.	30.30232	9.0785	.0001	25178.6	34269.3	96.460	15.14	19.44	3413.
2400.	33.15472	9.9034	.0001	28494.6	38441.0	98.268	18.07	22.65	3522.
2600.	36.15020	10.7282	.0001	32634.2	43479.2	100.281	23.08	28.25	3621.
2800.	39.41569	11.5531	.0001	38137.7	49962.4	102.685	30.93	37.23	3725.
3000.	43.14034	12.3779	.0001	45720.7	58662.8	105.690	42.21	50.52	3844.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.30 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	13.901	77.1630	628.1	.25612	91.1717	.01016	73.76	256.63	.00054	1.25216	2.2212
	14.	77.0933	628.6	.25525	90.5832	.01023	74.76	252.95	.00054	1.25185	2.1756
	15.	76.2817	613.9	.24492	80.9809	.01133	83.39	222.62	.00057	1.24899	1.8570
	16.	75.3938	616.7	.23354	74.9777	.01199	89.34	198.14	.00058	1.24588	1.6402
	17.	74.4636	616.5	.22441	69.2910	.01276	93.26	178.41	.00057	1.24262	1.5045
	18.	73.4888	614.4	.21680	63.9613	.01359	96.03	162.17	.00056	1.23921	1.4104
	19.	72.4621	606.9	.21028	58.3382	.01464	97.63	148.52	.00055	1.23562	1.3518
	20.	71.3718	597.7	.20443	52.9831	.01580	99.03	136.79	.00053	1.23182	1.3042
	22.	68.9515	568.4	.19426	42.1036	.01892	101.49	117.36	.00049	1.22341	1.2434
	24.	66.0882	524.8	.18403	31.1119	.02380	101.02	101.33	.00044	1.21352	1.2530
*	24.571	65.1597	512.3	.18067	28.3147	.02545	100.38	97.14	.00043	1.21032	1.2616
*	24.571	3.6738	205.1	.06760	.2296	.07336	22.70	14.13	.00148	1.01111	.9365
	26.	3.3372	224.0	.06825	.2437	.06162	23.20	14.80	.00181	1.01009	.8802
	28.	2.9829	249.7	.06846	.2568	.05142	24.23	15.74	.00228	1.00902	.8336
	30.	2.7106	274.6	.06840	.2656	.04469	25.43	16.67	.00275	1.00819	.8044
	32.	2.4916	298.8	.06829	.2719	.03980	26.69	17.59	.00324	1.00753	.7837
	34.	2.3100	322.4	.06822	.2767	.03604	27.96	18.49	.00375	1.00698	.7684
	36.	2.1560	345.5	.06816	.2804	.03304	29.27	19.39	.00428	1.00651	.7561
	38.	2.0233	368.3	.06809	.2833	.03057	30.58	20.26	.00483	1.00611	.7461
	40.	1.9073	390.9	.06801	.2857	.02849	31.90	21.13	.00541	1.00576	.7376
	42.	1.8050	413.3	.06793	.2876	.02671	33.22	21.98	.00600	1.00545	.7304
	44.	1.7138	435.6	.06784	.2892	.02516	34.53	22.81	.00662	1.00517	.7241
	46.	1.6319	457.8	.06775	.2906	.02380	35.84	23.64	.00726	1.00493	.7186
	48.	1.5580	479.8	.06766	.2917	.02259	37.14	24.45	.00792	1.00470	.7137
	50.	1.4908	501.9	.06755	.2927	.02151	38.42	25.25	.00859	1.00450	.7095
	55.	1.3467	557.2	.06720	.2946	.01925	41.53	27.19	.01035	1.00406	.7020
	60.	1.2289	612.9	.06674	.2960	.01744	44.54	29.07	.01221	1.00371	.6976
	65.	1.1305	669.6	.06615	.2970	.01596	47.64	30.88	.01420	1.00341	.6927
	70.	1.0472	727.7	.06541	.2977	.01472	50.51	32.64	.01621	1.00316	.6923
	75.	.9755	787.4	.06454	.2983	.01367	53.39	34.36	.01831	1.00294	.6926
	80.	.9131	848.9	.06354	.2987	.01276	55.91	36.02	.02034	1.00275	.6981
	90.	.8100	978.6	.06125	.2994	.01128	62.44	39.23	.02514	1.00244	.6935
	100.	.7280	1116.3	.05883	.2998	.01011	68.41	42.30	.02998	1.00219	.6978
	110.	.6612	1261.6	.05643	.3000	.00916	76.51	44.78	.03603	1.00199	.6768
	120.	.6057	1412.9	.05421	.3002	.00838	83.09	47.62	.04169	1.00183	.6788
	140.	.5188	1728.5	.05046	.3004	.00717	96.26	53.03	.05392	1.00156	.6824
	160.	.4538	2053.0	.04766	.3005	.00626	109.32	58.16	.06746	1.00137	.6839
	180.	.4033	2381.1	.04557	.3006	.00556	122.01	63.08	.08227	1.00122	.6844
	200.	.3630	2709.0	.04403	.3006	.00500	134.20	67.82	.09825	1.00109	.6846
	220.	.3300	3035.5	.04287	.3006	.00454	145.82	72.40	.11533	1.00099	.6848
	240.	.3025	3358.1	.04202	.3006	.00416	156.87	76.84	.13351	1.00091	.6850
	260.	.2792	3676.4	.04138	.3006	.00384	167.39	81.16	.15274	1.00084	.6850
	280.	.2593	3990.0	.04092	.3005	.00357	177.43	85.37	.17302	1.00078	.6850
	300.	.2421	4299.1	.04059	.3005	.00333	187.05	89.49	.19432	1.00073	.6849
	350.	.2075	5055.9	.04012	.3005	.00285	209.53	99.41	.25192	1.00063	.6846
	400.	.1816	5797.5	.03991	.3004	.00250	230.34	108.87	.31540	1.00055	.6843
	450.	.1614	6530.8	.03983	.3004	.00222	249.98	117.95	.38451	1.00049	.6841
	500.	.1453	7265.2	.03975	.3004	.00200	268.80	126.71	.45877	1.00044	.6843
	550.	.1321	7998.9	.03969	.3003	.00182	287.06	135.18	.53837	1.00040	.6842
	600.	.1211	8736.9	.03961	.3003	.00167	304.94	143.41	.62304	1.00036	.6842
	650.	.1118	9479.2	.03952	.3003	.00154	322.57	151.42	.71282	1.00034	.6840
	700.	.1038	10231.0	.03940	.3003	.00143	340.04	159.23	.80736	1.00031	.6839
	750.	.0969	10991.5	.03924	.3003	.00133	357.44	166.87	.90674	1.00029	.6837
	800.	.0909	11763.5	.03906	.3002	.00125	374.80	174.35	1.01072	1.00027	.6835
	850.	.0855	12548.4	.03884	.3002	.00118	392.19	181.69	1.11915	1.00026	.6834
	900.	.0808	13347.6	.03859	.3002	.00111	409.62	188.89	1.23190	1.00024	.6834
	950.	.0765	14162.0	.03831	.3002	.00105	427.12	195.98	1.34882	1.00023	.6836
	1000.	.0727	14992.2	.03801	.3002	.00100	444.70	202.95	1.46982	1.00022	.6838
	1100.	.0661	16689.5	.03738	.3002	.00091	475.56	216.59	1.70829	1.00020	.6906
	1200.	.0606	18445.7	.03672	.3002	.00083	511.01	229.87	1.97641	1.00018	.6911
	1300.	.0559	20260.4	.03603	.3001	.00077	546.94	242.83	2.26006	1.00017	.6916
	1400.	.0519	22133.0	.03533	.3001	.00071	583.38	255.50	2.55906	1.00016	.6921
	1500.	.0485	24064.6	.03464	.3001	.00067	620.48	267.90	2.87357	1.00015	.6924
	1600.	.0454	26047.2	.03397	.3001	.00062	658.30	280.05	3.20457	1.00014	.6923
	1700.	.0428	28115.1	.03327	.3001	.00059	698.13	291.97	3.55419	1.00013	.6914
	1800.	.0404	30314.4	.03249	.3001	.00056	741.85	303.67	3.92682	1.00012	.6892
	2000.	.0363	35464.6	.03045	.3000	.00050	854.94	326.46	4.77531	1.00011	.6772
	2200.	.0330	42712.3	.02729	.2996	.00046	1043.61	345.05	5.85603	1.00010	.6428
	2400.	.0302	54121.3	.02294	.2987	.00042	1385.67	366.77	7.30243	1.00009	.5995
	2600.	.0277	72662.5	.01807	.2968	.00039	1991.91	388.61	9.17575	1.00008	.5512
	2800.	.0254	101857.2	.01365	.2931	.00037	2993.16	411.19	11.40705	1.00008	.5115
	3000.	.0232	144953.9	.01022	.2869	.00035	4510.27	435.21	13.86503	1.00007	.4875

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.35 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.918	.01295	1.1844	.9273	218.3	222.9	14.090	4.69	6.39	1270.
14.	.01296	1.1826	.9272	218.9	223.4	14.129	4.71	6.42	1270.
15.	.01310	1.0667	.9194	225.5	230.1	14.588	4.91	6.95	1229.
16.	.01326	.9993	.9009	232.6	237.3	15.051	5.10	7.39	1203.
17.	.01342	.9353	.8856	240.2	244.9	15.513	5.29	7.86	1179.
18.	.01360	.8753	.8710	248.2	253.0	15.976	5.45	8.34	1157.
19.	.01379	.8100	.8559	256.7	261.6	16.440	5.60	8.87	1132.
20.	.01400	.7473	.8386	265.8	270.7	16.909	5.73	9.42	1108.
22.	.01449	.6161	.7982	285.7	290.8	17.867	5.94	10.72	1054.
24.	.01511	.4770	.7430	308.6	313.9	18.870	6.09	12.43	987.
* 25.299	.01562	.3858	.6949	325.5	330.9	19.562	6.16	13.89	933.
* 25.299	.23414	.0603	.0198	648.8	730.7	35.376	6.84	15.88	374.
26.	.24651	.0660	.0186	655.3	741.6	35.797	6.72	15.02	384.
28.	.27906	.0805	.0161	672.3	770.0	36.850	6.54	13.56	408.
30.	.30925	.0933	.0143	688.0	796.2	37.756	6.45	12.76	429.
32.	.33801	.1051	.0130	702.9	821.2	38.562	6.40	12.26	449.
34.	.36580	.1162	.0119	717.3	845.4	39.294	6.36	11.90	466.
36.	.39289	.1269	.0110	731.4	868.9	39.967	6.33	11.64	483.
38.	.41946	.1372	.0103	745.2	892.0	40.591	6.30	11.45	499.
40.	.44562	.1472	.0096	758.7	914.7	41.174	6.29	11.30	514.
42.	.47146	.1570	.0091	772.2	937.2	41.722	6.28	11.18	529.
44.	.49704	.1666	.0086	785.5	959.4	42.240	6.27	11.08	543.
46.	.52239	.1761	.0082	798.7	981.5	42.730	6.26	11.00	556.
48.	.54756	.1855	.0078	811.8	1003.5	43.197	6.26	10.93	569.
50.	.57257	.1947	.0074	824.9	1025.3	43.642	6.26	10.88	582.
55.	.63456	.2175	.0067	857.3	1079.4	44.675	6.27	10.79	612.
60.	.69594	.2398	.0061	889.6	1133.2	45.612	6.30	10.74	639.
65.	.75689	.2618	.0056	921.9	1186.9	46.469	6.34	10.73	666.
70.	.81750	.2836	.0051	954.4	1240.5	47.266	6.40	10.75	690.
75.	.87786	.3052	.0048	987.1	1294.4	48.009	6.48	10.79	713.
80.	.93802	.3267	.0045	1020.2	1348.5	48.707	6.57	10.86	735.
90.	1.05788	.3694	.0039	1087.8	1458.1	49.998	6.81	11.06	775.
100.	1.17730	.4117	.0035	1157.8	1569.8	51.175	7.08	11.30	811.
110.	1.29640	.4538	.0032	1230.4	1684.2	52.261	7.37	11.57	844.
120.	1.41526	.4958	.0029	1306.0	1801.3	53.281	7.67	11.86	876.
140.	1.65251	.5794	.0025	1465.6	2043.9	55.150	8.22	12.40	934.
160.	1.88933	.6626	.0022	1635.4	2296.6	56.835	8.70	12.86	990.
180.	2.12586	.7457	.0020	1813.7	2557.8	58.373	9.09	13.24	1042.
200.	2.36220	.8287	.0018	1999.0	2825.8	59.785	9.41	13.55	1093.
220.	2.59840	.9115	.0016	2189.9	3099.4	61.089	9.66	13.80	1141.
240.	2.83450	.9943	.0015	2385.2	3377.3	62.298	9.85	13.99	1188.
260.	3.07053	1.0770	.0013	2583.8	3658.5	63.424	10.00	14.13	1234.
280.	3.30649	1.1597	.0013	2785.0	3942.3	64.475	10.11	14.24	1278.
300.	3.54219	1.2423	.0012	2988.2	4228.0	65.460	10.19	14.32	1321.
350.	4.13177	1.4488	.0010	3501.0	4947.1	67.678	10.30	14.43	1425.
400.	4.72123	1.6552	.0009	4017.6	5670.0	69.609	10.35	14.48	1522.
450.	5.31060	1.8615	.0008	4536.0	6394.7	71.315	10.37	14.50	1613.
500.	5.89992	2.0679	.0007	5055.2	7120.1	72.843	10.39	14.52	1700.
550.	6.48920	2.2742	.0006	5574.9	7846.2	74.227	10.40	14.53	1782.
600.	7.07846	2.4804	.0006	6095.8	8573.2	75.489	10.42	14.55	1861.
650.	7.66770	2.6867	.0005	6617.5	9301.1	76.651	10.45	14.57	1936.
700.	8.25692	2.8929	.0005	7140.7	10030.7	77.739	10.48	14.60	2008.
750.	8.84614	3.0992	.0005	7666.0	10762.1	78.750	10.52	14.64	2077.
800.	9.43534	3.3054	.0004	8193.3	11495.7	79.697	10.57	14.69	2144.
850.	10.02454	3.5116	.0004	8723.5	12232.1	80.590	10.63	14.75	2208.
900.	10.61374	3.7179	.0004	9256.7	12971.5	81.434	10.70	14.82	227[illegible]
950.	11.20293	3.9241	.0004	9793.4	13714.4	82.236	10.77	14.90	2329.
1000.	11.79212	4.1303	.0004	10333.8	14461.1	83.001	10.86	14.98	2387.
1100.	12.97049	4.5428	.0003	11429.2	15968.9	84.427	11.04	15.16	2498.
1200.	14.14885	4.9552	.0003	12544.1	17496.2	85.749	11.24	15.36	2603.
1300.	15.32721	5.3676	.0003	13679.7	19044.2	86.987	11.45	15.58	2702.
1400.	16.50557	5.7801	.0003	14836.9	20613.8	88.157	11.68	15.80	2797.
1500.	17.68398	6.1925	.0002	16016.3	22205.7	89.270	11.91	16.04	2887.
1600.	18.86252	6.6049	.0002	17217.7	23819.6	90.304	12.14	16.27	2975.
1700.	20.04138	7.0173	.0002	18443.5	25458.0	91.293	12.40	16.53	3059.
1800.	21.22097	7.4298	.0002	19697.0	27124.3	92.244	12.69	16.82	3139.
2000.	23.58592	8.2546	.0002	22312.5	30567.5	94.068	13.51	17.68	3287.
2200.	25.97155	9.0794	.0002	25152.3	34242.3	95.811	15.00	19.29	3416.
2400.	28.40994	9.9043	.0001	28420.4	38363.9	97.597	17.73	22.28	3526.
2600.	30.96186	10.7291	.0001	32455.4	43292.1	99.566	22.40	27.49	3626.
2800.	33.72810	11.5540	.0001	37757.3	49562.2	101.891	29.70	35.82	3730.
3000.	36.85890	12.3788	.0001	44989.2	57889.9	104.769	40.19	48.15	3846.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.35 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.918	77.2115	629.7	.25606	91.4518	.01014	73.97	256.94	.00054	1.25226	2.2179
14.	77.1358	631.5	.25533	91.2209	.01016	74.80	253.85	.00054	1.25200	2.1782
15.	76.3270	615.5	.24531	81.4195	.01129	83.45	223.39	.00057	1.24915	1.8606
16.	75.4422	618.3	.23391	75.3921	.01195	89.42	198.82	.00058	1.24605	1.6426
17.	74.5163	618.2	.22476	69.6955	.01271	93.36	179.02	.00057	1.24280	1.5063
18.	73.5458	616.3	.21712	64.3776	.01353	96.15	162.73	.00056	1.23941	1.4114
19.	72.5233	608.8	.21059	58.7405	.01457	97.76	149.03	.00055	1.23583	1.3523
20.	71.4378	599.8	.20472	53.3890	.01571	99.18	137.27	.00053	1.23205	1.3040
22.	69.0324	571.1	.19454	42.5317	.01877	101.68	117.81	.00049	1.22369	1.2418
24.	66.1935	528.1	.18438	31.5729	.02353	101.27	101.78	.00044	1.21388	1.2489
* 25.299	64.0123	493.5	.17627	24.6963	.02814	99.53	92.41	.00040	1.20637	1.2892
* 25.299	4.2710	206.2	.06790	.2575	.07699	23.94	14.66	.00127	1.01293	.9725
26.	4.0566	216.0	.06830	.2678	.06953	24.06	14.98	.00142	1.01228	.9350
28.	3.5834	242.9	.06868	.2883	.05581	24.83	15.88	.00184	1.01084	.8674
30.	3.2336	268.7	.06865	.3016	.04749	25.88	16.80	.00226	1.00978	.8283
32.	2.9585	293.6	.06854	.3108	.04174	27.08	17.70	.00269	1.00894	.8012
34.	2.7337	317.7	.06847	.3177	.03745	28.32	18.60	.00313	1.00826	.7817
36.	2.5452	341.2	.06842	.3229	.03411	29.59	19.49	.00360	1.00769	.7666
38.	2.3840	364.4	.06834	.3270	.03141	30.88	20.36	.00407	1.00720	.7547
40.	2.2441	387.4	.06825	.3303	.02916	32.18	21.22	.00457	1.00678	.7447
42.	2.1211	410.1	.06816	.3330	.02725	33.48	22.06	.00508	1.00641	.7364
44.	2.0119	432.6	.06806	.3353	.02561	34.78	22.89	.00562	1.00607	.7293
46.	1.9143	455.0	.06796	.3372	.02417	36.07	23.71	.00617	1.00578	.7231
48.	1.8263	477.3	.06786	.3387	.02291	37.36	24.52	.00673	1.00551	.7177
50.	1.7465	499.5	.06774	.3401	.02178	38.63	25.31	.00732	1.00527	.7130
55.	1.5759	555.2	.06737	.3427	.01943	41.72	27.25	.00883	1.00476	.7047
60.	1.4369	611.2	.06690	.3446	.01757	44.71	29.12	.01043	1.00434	.6996
65.	1.3212	668.2	.06629	.3459	.01606	47.81	30.94	.01214	1.00399	.6942
70.	1.2232	726.5	.06554	.3469	.01480	50.66	32.69	.01387	1.00369	.6936
75.	1.1391	786.3	.06466	.3477	.01373	53.53	34.40	.01567	1.00344	.6937
80.	1.0661	848.0	.06366	.3483	.01281	56.04	36.06	.01742	1.00322	.6990
90.	.9453	977.9	.06135	.3492	.01131	62.56	39.27	.02155	1.00285	.6941
100.	.8494	1115.8	.05892	.3497	.01013	68.52	42.33	.02570	1.00256	.6982
110.	.7714	1261.3	.05650	.3501	.00918	76.56	44.79	.03087	1.00233	.6772
120.	.7066	1412.8	.05427	.3503	.00839	83.13	47.62	.03572	1.00213	.6792
140.	.6051	1728.6	.05051	.3506	.00717	96.29	53.03	.04621	1.00182	.6827
160.	.5293	2053.3	.04769	.3507	.00626	109.34	58.17	.05783	1.00160	.6841
180.	.4704	2381.6	.04560	.3508	.00556	122.04	63.09	.07053	1.00142	.6846
200.	.4233	2709.6	.04406	.3508	.00500	134.22	67.82	.08424	1.00128	.6847
220.	.3849	3036.3	.04289	.3508	.00454	145.84	72.40	.09888	1.00116	.6849
240.	.3528	3358.9	.04204	.3508	.00416	156.89	76.84	.11446	1.00106	.6850
260.	.3257	3677.3	.04140	.3508	.00384	167.41	81.16	.13095	1.00098	.6851
280.	.3024	3991.0	.04094	.3507	.00357	177.45	85.38	.14834	1.00091	.6851
300.	.2823	4300.3	.04061	.3507	.00333	187.06	89.49	.16660	1.00085	.6850
350.	.2420	5057.2	.04013	.3506	.00285	209.54	99.41	.21598	1.00073	.6846
400.	.2118	5798.8	.03993	.3506	.00250	230.35	108.87	.27040	1.00064	.6843
450.	.1883	6532.1	.03984	.3505	.00222	249.98	117.95	.32965	1.00057	.6841
500.	.1695	7266.6	.03976	.3505	.00200	268.80	126.71	.39331	1.00051	.6843
550.	.1541	8000.3	.03970	.3505	.00182	287.06	135.18	.46154	1.00046	.6842
600.	.1413	8738.3	.03962	.3504	.00166	304.94	143.41	.53413	1.00043	.6842
650.	.1304	9480.7	.03953	.3504	.00154	322.57	151.42	.61109	1.00039	.6840
700.	.1211	10232.5	.03940	.3504	.00143	340.05	159.23	.69213	1.00036	.6839
750.	.1130	10993.0	.03925	.3503	.00133	357.44	166.87	.77731	1.00034	.6837
800.	.1060	11765.0	.03906	.3503	.00125	374.81	174.35	.86644	1.00032	.6835
850.	.0998	12549.9	.03884	.3503	.00118	392.19	181.69	.95940	1.00030	.6834
900.	.0942	13349.1	.03859	.3503	.00111	409.62	188.89	1.05604	1.00028	.6834
950.	.0893	14163.6	.03831	.3503	.00105	427.12	195.98	1.15627	1.00027	.6836
1000.	.0848	14993.8	.03801	.3503	.00100	444.71	202.95	1.25998	1.00026	.6838
1100.	.0771	16691.1	.03739	.3502	.00091	475.56	216.59	1.46438	1.00023	.6906
1200.	.0707	18447.3	.03672	.3502	.00083	511.01	229.87	1.69421	1.00021	.6911
1300.	.0652	20261.9	.03603	.3502	.00077	546.94	242.83	1.93735	1.00020	.6916
1400.	.0606	22134.2	.03534	.3502	.00071	583.36	255.50	2.19362	1.00018	.6921
1500.	.0565	24064.8	.03464	.3502	.00067	620.42	267.90	2.46315	1.00017	.6924
1600.	.0530	26044.6	.03398	.3502	.00062	658.13	280.05	2.74669	1.00016	.6924
1700.	.0499	28105.6	.03329	.3501	.00059	697.69	291.97	3.04593	1.00015	.6916
1800.	.0471	30290.2	.03253	.3501	.00056	740.84	303.67	3.36433	1.00014	.6896
2000.	.0424	35359.9	.03056	.3500	.00050	850.83	326.46	4.08594	1.00013	.6784
2200.	.0385	42378.5	.02754	.3496	.00046	1030.76	345.03	4.99720	1.00012	.6456
2400.	.0352	53256.2	.02336	.3486	.00042	1352.72	366.72	6.21020	1.00011	.6040
2600.	.0323	70753.3	.01861	.3465	.00039	1919.68	388.49	7.78488	1.00010	.5562
2800.	.0296	98166.3	.01420	.3426	.00036	2854.15	410.92	9.67467	1.00009	.5157
3000.	.0271	138607.2	.01070	.3358	.00035	4271.99	434.69	11.77275	1.00008	.4899

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.40 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	13.935	.01295	1.1876	.9279	218.4	223.5	14.091	4.69	6.39	1271.
	14.	.01296	1.1902	.9278	218.8	224.0	14.122	4.71	6.41	1273.
	15.	.01309	1.0718	.9211	225.4	230.6	14.581	4.91	6.94	1231.
	16.	.01325	1.0042	.9025	232.5	237.8	15.043	5.10	7.38	1205.
	17.	.01341	.9401	.8872	240.0	245.4	15.505	5.29	7.85	1181.
	18.	.01358	.8826	.8729	248.0	253.5	15.965	5.45	8.32	1160.
	19.	.01378	.8191	.8576	256.5	262.0	16.429	5.60	8.84	1137.
	20.	.01399	.7523	.8402	265.6	271.2	16.898	5.73	9.40	1111.
	22.	.01447	.6215	.8000	285.4	291.2	17.853	5.94	10.68	1057.
	24.	.01508	.4831	.7454	308.2	314.2	18.852	6.09	12.37	991.
*	25.957	.01590	.3437	.6694	334.2	340.6	19.906	6.19	14.74	905.
*	25.957	.20496	.0579	.0229	648.3	730.3	34.929	6.89	16.79	376.
	26.	.20572	.0583	.0228	648.7	731.0	34.958	6.88	16.71	376.
	28.	.23648	.0745	.0193	667.3	761.9	36.100	6.62	14.44	403.
	30.	.26426	.0884	.0170	683.8	789.5	37.055	6.51	13.33	425.
	32.	.29036	.1009	.0153	699.3	815.4	37.893	6.44	12.66	445.
	34.	.31537	.1126	.0139	714.1	840.3	38.646	6.39	12.20	464.
	36.	.33963	.1237	.0128	728.5	864.4	39.334	6.35	11.88	481.
	38.	.36332	.1343	.0119	742.6	887.9	39.970	6.32	11.64	497.
	40.	.38659	.1446	.0112	756.4	911.0	40.563	6.30	11.46	513.
	42.	.40952	.1547	.0105	770.0	933.8	41.118	6.29	11.32	528.
	44.	.43217	.1645	.0099	783.4	956.3	41.641	6.28	11.20	542.
	46.	.45460	.1742	.0094	796.7	978.6	42.137	6.27	11.11	555.
	48.	.47684	.1837	.0089	810.0	1000.7	42.608	6.27	11.03	568.
	50.	.49892	.1931	.0085	823.1	1022.7	43.057	6.27	10.96	581.
	55.	.55355	.2162	.0077	855.8	1077.2	44.097	6.28	10.85	611.
	60.	.60758	.2387	.0070	888.3	1131.3	45.039	6.30	10.79	639.
	65.	.66116	.2610	.0064	920.7	1185.2	45.900	6.35	10.77	666.
	70.	.71441	.2829	.0059	953.3	1239.1	46.699	6.41	10.78	690.
	75.	.76741	.3047	.0055	986.1	1293.1	47.444	6.48	10.82	713.
	80.	.82020	.3263	.0051	1019.3	1347.4	48.145	6.58	10.89	735.
	90.	.92533	.3691	.0045	1087.0	1457.1	49.439	6.81	11.08	775.
	100.	1.03002	.4116	.0041	1157.1	1569.1	50.617	7.08	11.32	811.
	110.	1.13438	.4539	.0037	1229.8	1683.5	51.705	7.37	11.59	845.
	120.	1.23851	.4959	.0034	1305.4	1800.8	52.726	7.67	11.87	876.
	140.	1.44630	.5796	.0029	1465.1	2043.6	54.596	8.23	12.40	935.
	160.	1.65365	.6630	.0025	1635.0	2296.4	56.282	8.70	12.86	990.
	180.	1.86072	.7462	.0022	1813.4	2557.7	57.821	9.09	13.25	1043.
	200.	2.06760	.8292	.0020	1998.7	2825.8	59.233	9.41	13.55	1093.
	220.	2.27434	.9121	.0018	2189.7	3099.4	60.537	9.66	13.80	1142.
	240.	2.48098	.9949	.0017	2385.0	3377.4	61.746	9.85	13.99	1189.
	260.	2.68754	1.0777	.0015	2583.6	3658.7	62.873	10.00	14.13	1234.
	280.	2.89405	1.1604	.0014	2784.9	3942.5	63.924	10.11	14.24	1279.
	300.	3.10031	1.2430	.0013	2988.0	4228.2	64.909	10.19	14.32	1322.
	350.	3.61625	1.4496	.0011	3500.9	4947.4	67.127	10.30	14.43	1425.
	400.	4.13206	1.6560	.0010	4017.5	5670.3	69.058	10.35	14.48	1522.
	450.	4.64779	1.8624	.0009	4535.9	6395.0	70.764	10.37	14.50	1613.
	500.	5.16346	2.0687	.0008	5055.1	7120.5	72.292	10.39	14.52	1700.
	550.	5.67910	2.2750	.0007	5574.9	7846.5	73.677	10.40	14.53	1782.
	600.	6.19471	2.4813	.0007	6095.7	8573.6	74.939	10.42	14.55	1861.
	650.	6.71030	2.6875	.0006	6617.4	9301.5	76.101	10.45	14.57	1936.
	700.	7.22588	2.8938	.0006	7140.7	10031.0	77.189	10.48	14.60	2008.
	750.	7.74145	3.1000	.0005	7666.0	10762.5	78.199	10.52	14.64	2077.
	800.	8.25701	3.3063	.0005	8193.3	11496.1	79.147	10.57	14.69	2144.
	850.	8.77256	3.5125	.0005	8723.5	12232.5	80.039	10.63	14.75	2208.
	900.	9.28811	3.7187	.0004	9256.7	12971.9	80.883	10.70	14.82	2270.
	950.	9.80366	3.9250	.0004	9793.3	13714.8	81.685	10.77	14.90	2330.
	1000.	10.31920	4.1312	.0004	10333.8	14461.5	82.450	10.86	14.98	2388.
	1100.	11.35028	4.5436	.0004	11429.2	15969.3	83.877	11.04	15.16	2498.
	1200.	12.38135	4.9561	.0003	12544.1	17496.6	85.198	11.24	15.36	2603.
	1300.	13.41241	5.3685	.0003	13679.7	19044.6	86.436	11.45	15.58	2702.
	1400.	14.44349	5.7809	.0003	14836.9	20614.2	87.607	11.68	15.80	2797.
	1500.	15.47459	6.1934	.0003	16016.2	22206.1	88.719	11.91	16.03	2888.
	1600.	16.50580	6.6058	.0003	17217.5	23819.8	89.754	12.14	16.27	2975.
	1700.	17.53728	7.0182	.0002	18443.0	25457.9	90.742	12.39	16.52	3059.
	1800.	18.56935	7.4306	.0002	19695.6	27123.4	91.693	12.68	16.81	3139.
	2000.	20.63822	8.2555	.0002	22306.3	30561.6	93.514	13.47	17.64	3288.
	2200.	22.72401	9.0803	.0002	25131.1	34220.7	95.249	14.89	19.16	3418.
	2400.	24.85299	9.9052	.0002	28360.6	38301.8	97.018	17.46	21.98	3530.
	2600.	27.07490	10.7300	.0002	32311.3	43141.3	98.952	21.84	26.87	3631.
	2800.	29.47226	11.5548	.0001	37450.7	49239.6	101.214	28.70	34.68	3733.
	3000.	32.16812	12.3797	.0001	44399.4	57266.7	103.987	38.56	46.24	3848.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.40 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DV)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	13.935	77.2399	631.3	.25599	91.7322	.01011	74.18	257.26	.00054	1.25236	2.2146
	14.	77.1782	634.3	.25541	91.8568	.01010	74.84	254.75	.00054	1.25215	2.1808
	15.	76.3720	617.1	.24570	81.8567	.01125	83.51	224.16	.00057	1.24931	1.8642
	16.	75.4904	619.9	.23427	75.8051	.01191	89.50	199.49	.00058	1.24621	1.6451
	17.	74.5686	619.9	.22511	70.0983	.01266	93.46	179.63	.00058	1.24298	1.5081
	18.	73.6116	619.2	.21750	64.9667	.01344	96.28	163.38	.00057	1.23964	1.4118
	19.	72.5911	612.8	.21094	59.4563	.01442	97.90	149.60	.00055	1.23607	1.3507
	20.	71.5035	602.0	.20502	53.7931	.01562	99.33	137.75	.00053	1.23228	1.3039
	22.	69.1127	573.7	.19481	42.9569	.01862	101.87	118.25	.00050	1.22397	1.2402
	24.	66.2974	531.4	.18472	32.0293	.02327	101.52	102.22	.00045	1.21424	1.2451
*	25.957	62.9088	476.2	.17182	21.6193	.03096	98.50	88.30	.00038	1.20259	1.3217
*	25.957	4.8790	206.9	.06820	.2826	.08113	25.16	15.16	.00111	1.01478	1.0118
	26.	4.8610	207.6	.06823	.2835	.08050	25.15	15.18	.00111	1.01472	1.0085
	28.	4.2287	235.9	.06888	.3152	.06120	25.51	16.05	.00150	1.01280	.9083
	30.	3.7842	262.8	.06889	.3344	.05072	26.38	16.94	.00188	1.01145	.8556
	32.	3.4440	288.4	.06878	.3475	.04389	27.51	17.83	.00227	1.01042	.8205
	34.	3.1708	313.0	.06871	.3570	.03898	28.69	18.71	.00267	1.00959	.7960
	36.	2.9444	337.0	.06868	.3641	.03525	29.92	19.59	.00308	1.00890	.7778
	38.	2.7524	360.6	.06860	.3697	.03229	31.18	20.45	.00350	1.00832	.7637
	40.	2.5867	383.8	.06850	.3741	.02986	32.46	21.31	.00394	1.00782	.7522
	42.	2.4419	406.8	.06840	.3777	.02781	33.74	22.15	.00440	1.00738	.7427
	44.	2.3139	429.7	.06828	.3807	.02607	35.03	22.97	.00487	1.00699	.7347
	46.	2.1997	452.3	.06817	.3832	.02456	36.31	23.79	.00535	1.00664	.7277
	48.	2.0971	474.8	.06806	.3853	.02323	37.58	24.59	.00585	1.00633	.7217
	50.	2.0043	497.2	.06793	.3871	.02205	38.84	25.38	.00636	1.00605	.7166
	55.	1.8065	553.3	.06754	.3905	.01962	41.91	27.32	.00770	1.00545	.7073
	60.	1.6459	609.6	.06705	.3929	.01770	44.89	29.18	.00910	1.00497	.7016
	65.	1.5125	666.8	.06644	.3947	.01615	47.97	30.99	.01060	1.00456	.6958
	70.	1.3998	725.3	.06567	.3960	.01487	50.82	32.74	.01212	1.00422	.6948
	75.	1.3031	785.3	.06478	.3970	.01378	53.66	34.45	.01370	1.00393	.6948
	80.	1.2192	847.1	.06377	.3978	.01285	56.16	36.11	.01523	1.00368	.6999
	90.	1.0807	977.3	.06144	.3989	.01133	62.68	39.31	.01885	1.00326	.6947
	100.	.9709	1115.4	.05900	.3996	.01015	68.63	42.37	.02249	1.00293	.6986
	110.	.8815	1261.0	.05657	.4001	.00919	76.60	44.80	.02700	1.00266	.6777
	120.	.8074	1412.7	.05433	.4004	.00840	83.17	47.63	.03125	1.00243	.6796
	140.	.6914	1728.7	.05056	.4008	.00717	96.33	53.04	.04044	1.00208	.6829
	160.	.6047	2053.6	.04773	.4010	.00626	109.37	58.18	.05061	1.00182	.6843
	180.	.5374	2382.1	.04564	.4010	.00556	122.06	63.09	.06172	1.00162	.6847
	200.	.4837	2710.2	.04409	.4010	.00500	134.24	67.83	.07372	1.00146	.6848
	220.	.4397	3037.0	.04292	.4010	.00454	145.85	72.40	.08654	1.00133	.6850
	240.	.4031	3359.8	.04206	.4010	.00416	156.90	76.84	.10018	1.00121	.6851
	260.	.3721	3678.3	.04142	.4010	.00384	167.42	81.17	.11461	1.00112	.6852
	280.	.3455	3992.1	.04096	.4010	.00357	177.46	85.38	.12983	1.00104	.6851
	300.	.3225	4301.4	.04062	.4009	.00333	187.07	89.50	.14582	1.00097	.6850
	350.	.2765	5058.4	.04014	.4008	.00285	209.55	99.41	.18903	1.00083	.6847
	400.	.2420	5800.1	.03994	.4008	.00250	230.36	108.88	.23666	1.00073	.6843
	450.	.2152	6533.5	.03985	.4007	.00222	249.99	117.96	.28850	1.00065	.6841
	500.	.1937	7268.0	.03977	.4006	.00200	268.81	126.71	.34421	1.00058	.6843
	550.	.1761	8001.8	.03971	.4006	.00182	287.07	135.19	.40392	1.00053	.6842
	600.	.1614	8739.8	.03963	.4005	.00166	304.95	143.41	.46744	1.00049	.6842
	650.	.1490	9482.1	.03954	.4005	.00154	322.58	151.42	.53479	1.00045	.6840
	700.	.1384	10234.0	.03941	.4005	.00143	340.05	159.23	.60571	1.00042	.6839
	750.	.1292	10994.5	.03925	.4004	.00133	357.44	166.87	.68025	1.00039	.6837
	800.	.1211	11766.5	.03907	.4004	.00125	374.81	174.35	.75824	1.00036	.6835
	850.	.1140	12551.5	.03885	.4004	.00118	392.19	181.69	.83958	1.00034	.6834
	900.	.1077	13350.7	.03860	.4004	.00111	409.62	188.89	.92415	1.00032	.6834
	950.	.1020	14165.1	.03832	.4004	.00105	427.12	195.98	1.01185	1.00031	.6836
	1000.	.0969	14995.4	.03801	.4003	.00100	444.71	202.95	1.10261	1.00029	.6838
	1100.	.0881	16692.7	.03739	.4003	.00091	475.56	216.59	1.28146	1.00027	.6906
	1200.	.0808	18448.9	.03672	.4003	.00083	511.01	229.87	1.48256	1.00024	.6911
	1300.	.0746	20263.5	.03603	.4003	.00077	546.93	242.83	1.69531	1.00022	.6916
	1400.	.0692	22135.5	.03534	.4002	.00071	583.35	255.50	1.91955	1.00021	.6921
	1500.	.0646	24065.3	.03465	.4002	.00067	620.37	267.90	2.15535	1.00019	.6924
	1600.	.0606	26042.8	.03399	.4002	.00062	657.99	280.05	2.40333	1.00018	.6924
	1700.	.0570	28098.3	.03330	.4002	.00059	697.33	291.97	2.66486	1.00017	.6917
	1800.	.0539	30271.1	.03256	.4002	.00056	740.02	303.67	2.94275	1.00016	.6898
	2000.	.0485	35276.0	.03065	.4000	.00050	847.52	326.46	3.57013	1.00015	.6794
	2200.	.0440	42109.6	.02775	.3996	.00046	1020.40	345.02	4.35667	1.00013	.6479
	2400.	.0402	52558.9	.02372	.3986	.00042	1326.15	366.69	5.39833	1.00012	.6077
	2600.	.0369	69212.4	.01907	.3963	.00039	1861.36	388.40	6.75244	1.00011	.5606
	2800.	.0339	95181.3	.01467	.3921	.00036	2741.70	410.70	8.38750	1.00010	.5195
	3000.	.0311	133455.3	.01112	.3848	.00035	4078.54	434.27	10.21507	1.00009	.4923

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.45 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.951	.01294	1.1908	.9284	218.4	224.2	14.092	4.70	6.39	1273.
14.	.01295	1.1978	.9284	218.7	224.5	14.116	4.71	6.40	1276.
15.	.01309	1.0769	.9229	225.3	231.2	14.574	4.91	6.94	1234.
16.	.01324	1.0090	.9041	232.4	238.3	15.036	5.10	7.37	1208.
17.	.01340	.9507	.8892	239.9	245.9	15.494	5.28	7.82	1186.
18.	.01357	.8876	.8744	247.9	254.0	15.956	5.45	8.31	1163.
19.	.01376	.8243	.8592	256.4	262.5	16.419	5.60	8.82	1140.
20.	.01397	.7601	.8420	265.4	271.6	16.886	5.73	9.37	1115.
22.	.01445	.6269	.8017	285.1	291.6	17.840	5.94	10.65	1060.
24.	.01506	.4892	.7477	307.7	314.5	18.835	6.08	12.31	995.
26.	.01588	.3456	.6711	334.2	341.4	19.906	6.19	14.74	907.
* 26.559	.01617	.3101	.6442	342.6	349.9	20.231	6.23	15.52	879.
* 26.559	.18180	.0554	.0262	647.4	729.2	34.521	6.95	17.79	377.
28.	.20287	.0682	.0229	661.8	753.1	35.395	6.72	15.56	397.
30.	.22901	.0833	.0198	679.4	782.4	36.410	6.57	13.99	421.
32.	.25315	.0966	.0177	695.5	809.5	37.282	6.48	13.11	442.
34.	.27606	.1089	.0160	710.9	835.1	38.059	6.42	12.54	461.
36.	.29814	.1204	.0147	725.6	859.7	38.764	6.37	12.14	479.
38.	.31962	.1314	.0137	739.9	883.7	39.413	6.34	11.85	496.
40.	.34065	.1420	.0128	753.9	907.2	40.015	6.32	11.63	511.
42.	.36132	.1523	.0120	767.7	930.3	40.578	6.30	11.46	526.
44.	.38171	.1624	.0113	781.3	953.1	41.108	6.29	11.33	541.
46.	.40187	.1723	.0107	794.8	975.6	41.609	6.28	11.22	554.
48.	.42183	.1819	.0102	808.1	998.0	42.084	6.28	11.13	568.
50.	.44163	.1915	.0097	821.4	1020.1	42.537	6.28	11.05	581.
55.	.49055	.2149	.0087	854.3	1075.0	43.583	6.28	10.92	611.
60.	.53885	.2377	.0079	886.9	1129.4	44.531	6.31	10.85	639.
65.	.58671	.2601	.0072	919.5	1183.5	45.396	6.35	10.81	666.
70.	.63424	.2822	.0066	952.2	1237.6	46.198	6.41	10.82	690.
75.	.68151	.3041	.0062	985.1	1291.8	46.945	6.49	10.85	713.
80.	.72857	.3259	.0058	1018.4	1346.2	47.648	6.58	10.91	735.
90.	.82224	.3689	.0051	1086.2	1456.2	48.944	6.81	11.10	775.
100.	.91547	.4115	.0046	1156.3	1568.3	50.124	7.08	11.33	812.
110.	1.00837	.4539	.0041	1229.2	1682.9	51.213	7.37	11.60	845.
120.	1.10105	.4961	.0038	1304.9	1800.3	52.235	7.67	11.88	877.
140.	1.28591	.5799	.0032	1464.6	2043.3	54.107	8.23	12.41	935.
160.	1.47035	.6634	.0028	1634.6	2296.2	55.794	8.70	12.87	991.
180.	1.65450	.7467	.0025	1813.0	2557.6	57.333	9.09	13.25	1043.
200.	1.83846	.8297	.0023	1998.5	2825.8	58.746	9.41	13.56	1094.
220.	2.02229	.9127	.0021	2189.4	3099.4	60.050	9.66	13.80	1142.
240.	2.20601	.9956	.0019	2384.7	3377.5	61.260	9.85	13.99	1189.
260.	2.38966	1.0784	.0017	2583.4	3658.8	62.386	10.00	14.13	1235.
280.	2.57325	1.1611	.0016	2784.7	3942.6	63.437	10.11	14.24	1279.
300.	2.75664	1.2437	.0015	2987.9	4228.4	64.422	10.19	14.32	1322.
350.	3.21529	1.4503	.0013	3500.7	4947.6	66.641	10.30	14.43	1425.
400.	3.67382	1.6568	.0011	4017.4	5670.6	68.572	10.35	14.48	1522.
450.	4.13227	1.8632	.0010	4535.8	6395.4	70.278	10.37	14.50	1614.
500.	4.59066	2.0695	.0009	5055.0	7120.8	71.806	10.39	14.52	1700.
550.	5.04901	2.2758	.0008	5574.8	7846.9	73.191	10.40	14.53	1783.
600.	5.50735	2.4821	.0008	6095.7	8574.0	74.453	10.42	14.55	1861.
650.	5.96566	2.6884	.0007	6617.4	9301.9	75.615	10.45	14.57	1936.
700.	6.42396	2.8946	.0006	7140.7	10031.4	76.703	10.48	14.60	2008.
750.	6.88225	3.1009	.0006	7665.9	10762.9	77.714	10.52	14.64	2078.
800.	7.34053	3.3071	.0006	8193.3	11496.5	78.661	10.57	14.69	2144.
850.	7.79880	3.5134	.0005	8723.4	12232.9	79.553	10.63	14.75	2208.
900.	8.25707	3.7196	.0005	9256.7	12972.3	80.397	10.70	14.82	2270.
950.	8.71534	3.9258	.0005	9793.3	13715.2	81.199	10.77	14.90	2330.
1000.	9.17360	4.1321	.0005	10333.8	14461.9	81.964	10.86	14.98	2388.
1100.	10.09011	4.5445	.0004	11429.2	15969.8	83.391	11.04	15.16	2498.
1200.	11.00662	4.9570	.0004	12544.1	17497.0	84.712	11.24	15.36	2603.
1300.	11.92313	5.3694	.0003	13679.6	19045.1	85.950	11.45	15.58	2702.
1400.	12.83964	5.7818	.0003	14836.8	20614.7	87.121	11.68	15.80	2797.
1500.	13.75618	6.1943	.0003	16016.2	22206.4	88.233	11.91	16.03	2888.
1600.	14.67280	6.6067	.0003	17217.3	23820.1	89.288	12.14	16.27	2975.
1700.	15.58965	7.0191	.0003	18442.5	25457.9	90.256	12.39	16.52	3059.
1800.	16.50700	7.4315	.0003	19694.5	27122.6	91.206	12.67	16.80	3140.
2000.	18.34565	8.2564	.0002	22301.3	30556.8	93.026	13.43	17.60	3289.
2200.	20.19848	9.0812	.0002	25113.5	34202.9	94.755	14.79	19.06	3420.
2400.	22.08751	9.9061	.0002	28311.1	38250.5	96.509	17.24	21.73	3533.
2600.	24.05444	10.7309	.0002	32192.0	43016.5	98.414	21.39	26.36	3634.
2800.	26.16841	11.5557	.0002	37196.7	48972.5	100.623	27.87	33.74	3737.
3000.	28.53263	12.3806	.0002	43910.7	56750.4	103.311	37.20	44.65	3851.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.45 MPA ISOBAR

TEMPERATURE	DENSITY	$V(\partial H/\partial V)_p$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_p/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 13.951	77.2682	632.9	.25593	92.0130	.01009	74.39	257.57	.00054	1.25246	2.2114
14.	77.2204	637.1	.25549	92.4910	.01004	74.88	255.65	.00055	1.25229	2.1835
15.	76.4169	618.8	.24609	82.2925	.01121	83.56	224.94	.00057	1.24947	1.8679
16.	75.5384	621.5	.23463	76.2168	.01186	89.57	200.17	.00058	1.24638	1.6477
17.	74.6359	624.1	.22553	70.9596	.01253	93.58	180.43	.00058	1.24322	1.5080
18.	73.6679	621.2	.21781	65.3899	.01337	96.39	163.94	.00057	1.23983	1.4128
19.	72.6516	614.9	.21124	59.8860	.01435	98.03	150.12	.00055	1.23628	1.3510
20.	71.5763	605.4	.20534	54.4031	.01548	99.49	138.28	.00053	1.23253	1.3024
22.	69.1922	576.3	.19508	43.3793	.01848	102.06	118.70	.00050	1.22425	1.2387
24.	66.3999	534.6	.18505	32.4811	.02302	101.77	102.67	.00045	1.21459	1.2414
26.	62.9732	477.9	.17207	21.7659	.03083	98.75	88.50	.00038	1.20281	1.3205
* 26.559	61.8352	462.1	.16730	19.1753	.03360	97.35	84.64	.00037	1.19891	1.3497
* 26.559	5.5006	207.2	.06848	.3048	.08585	26.38	15.64	.00097	1.01667	1.0548
28.	4.9293	228.8	.06903	.3363	.06801	26.33	16.23	.00124	1.01493	.9590
30.	4.3667	256.7	.06911	.3638	.05449	26.94	17.09	.00159	1.01322	.8873
32.	3.9503	283.2	.06901	.3817	.04630	27.97	17.96	.00194	1.01195	.8420
34.	3.6224	308.4	.06896	.3944	.04065	29.09	18.83	.00231	1.01096	.8117
36.	3.3541	332.8	.06894	.4039	.03647	30.27	19.70	.00268	1.01014	.7897
38.	3.1287	356.7	.06886	.4112	.03322	31.50	20.55	.00306	1.00946	.7731
40.	2.9356	380.3	.06875	.4169	.03058	32.76	21.40	.00345	1.00887	.7599
42.	2.7676	403.6	.06864	.4216	.02840	34.02	22.23	.00386	1.00836	.7492
44.	2.6198	426.7	.06851	.4254	.02654	35.28	23.06	.00428	1.00792	.7402
46.	2.4884	449.6	.06839	.4286	.02495	36.55	23.87	.00471	1.00752	.7324
48.	2.3706	472.3	.06826	.4313	.02356	37.81	24.67	.00516	1.00716	.7258
50.	2.2644	494.9	.06812	.4336	.02233	39.06	25.45	.00562	1.00684	.7202
55.	2.0385	551.4	.06771	.4380	.01981	42.11	27.38	.00681	1.00616	.7100
60.	1.8558	608.0	.06721	.4411	.01784	45.06	29.24	.00806	1.00560	.7037
65.	1.7044	665.4	.06658	.4433	.01625	48.13	31.04	.00940	1.00514	.6974
70.	1.5767	724.1	.06580	.4450	.01494	50.97	32.79	.01076	1.00476	.6961
75.	1.4673	784.3	.06490	.4463	.01384	53.80	34.49	.01216	1.00443	.6960
80.	1.3726	846.3	.06388	.4473	.01290	56.29	36.15	.01353	1.00414	.7009
90.	1.2162	976.7	.06154	.4487	.01136	62.80	39.35	.01675	1.00367	.6953
100.	1.0923	1114.9	.05908	.4495	.01016	68.74	42.40	.01999	1.00329	.6990
110.	.9917	1260.8	.05664	.4501	.00920	76.65	44.81	.02399	1.00299	.6782
120.	.9082	1412.5	.05439	.4505	.00841	83.21	47.64	.02777	1.00274	.6800
140.	.7777	1728.9	.05060	.4510	.00718	96.36	53.05	.03594	1.00234	.6832
160.	.6801	2054.0	.04777	.4512	.00627	109.40	58.18	.04499	1.00205	.6845
180.	.6044	2382.6	.04567	.4513	.00556	122.08	63.10	.05487	1.00182	.6849
200.	.5439	2710.8	.04411	.4513	.00500	134.26	67.83	.06555	1.00164	.6849
220.	.4945	3037.8	.04294	.4513	.00454	145.87	72.41	.07694	1.00149	.6851
240.	.4533	3360.6	.04208	.4513	.00416	156.92	76.85	.08907	1.00137	.6852
260.	.4185	3679.2	.04144	.4513	.00384	167.43	81.17	.10191	1.00126	.6852
280.	.3886	3993.1	.04098	.4512	.00357	177.47	85.38	.11544	1.00117	.6852
300.	.3628	4302.5	.04064	.4512	.00333	187.08	89.50	.12965	1.00109	.6851
350.	.3110	5059.6	.04016	.4511	.00285	209.56	99.42	.16807	1.00094	.6847
400.	.2722	5801.5	.03995	.4510	.00250	230.37	108.88	.21041	1.00082	.6844
450.	.2420	6534.9	.03986	.4509	.00222	250.00	117.96	.25650	1.00073	.6841
500.	.2178	7269.4	.03978	.4508	.00200	268.82	126.71	.30603	1.00066	.6843
550.	.1981	8003.2	.03971	.4507	.00182	287.07	135.19	.35911	1.00060	.6843
600.	.1816	8741.2	.03964	.4507	.00166	304.95	143.41	.41557	1.00055	.6842
650.	.1676	9483.6	.03954	.4506	.00154	322.58	151.42	.47544	1.00051	.6840
700.	.1557	10235.5	.03941	.4506	.00143	340.05	159.23	.53849	1.00047	.6839
750.	.1453	10996.0	.03926	.4506	.00133	357.45	166.87	.60475	1.00044	.6837
800.	.1362	11768.0	.03907	.4505	.00125	374.82	174.35	.67408	1.00041	.6835
850.	.1282	12553.0	.03885	.4505	.00118	392.20	181.69	.74639	1.00039	.6834
900.	.1211	13352.2	.03860	.4505	.00111	409.63	188.89	.82156	1.00036	.6834
950.	.1147	14166.7	.03832	.4505	.00105	427.13	195.98	.89953	1.00035	.6836
1000.	.1090	14996.9	.03802	.4504	.00100	444.71	202.95	.98020	1.00033	.6838
1100.	.0991	16694.3	.03739	.4504	.00091	475.56	216.59	1.13918	1.00030	.6906
1200.	.0909	18450.5	.03673	.4504	.00083	511.01	229.87	1.31795	1.00027	.6911
1300.	.0839	20265.1	.03604	.4503	.00077	546.93	242.83	1.50706	1.00025	.6916
1400.	.0779	22136.9	.03534	.4503	.00071	583.33	255.50	1.70638	1.00023	.6921
1500.	.0727	24066.0	.03465	.4503	.00067	620.33	267.90	1.91596	1.00022	.6924
1600.	.0682	26041.6	.03399	.4503	.00062	657.87	280.05	2.13630	1.00021	.6925
1700.	.0641	28092.5	.03331	.4502	.00059	697.03	291.97	2.36854	1.00019	.6918
1800.	.0606	30255.6	.03258	.4502	.00056	739.34	303.67	2.61504	1.00018	.6901
2000.	.0545	35206.7	.03073	.4500	.00050	844.78	326.45	3.16974	1.00016	.6802
2200.	.0495	41887.3	.02793	.4496	.00045	1011.82	345.01	3.86078	1.00015	.6498
2400.	.0453	51981.3	.02403	.4485	.00042	1304.12	366.66	4.77168	1.00014	.6110
2600.	.0416	67934.9	.01947	.4461	.00039	1812.99	388.31	5.95663	1.00013	.5645
2800.	.0382	92702.4	.01509	.4416	.00036	2648.30	410.52	7.39471	1.00012	.5230
3000.	.0350	129163.9	.01151	.4339	.00035	3917.37	433.91	9.01166	1.00011	.4946

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.968	.01294	1.1940	.9290	218.4	224.9	14.093	4.70	6.39	1274.
14.	.01294	1.2053	.9289	218.6	225.1	14.109	4.70	6.38	1279.
15.	.01308	1.0819	.9246	225.2	231.7	14.567	4.91	6.93	1237.
16.	.01323	1.0138	.9058	232.3	238.9	15.028	5.10	7.37	1210.
17.	.01339	.9559	.8908	239.7	246.4	15.486	5.28	7.81	1189.
18.	.01356	.8927	.8759	247.7	254.5	15.947	5.45	8.29	1166.
19.	.01375	.8295	.8607	256.2	263.1	16.409	5.60	8.81	1142.
20.	.01396	.7653	.8436	265.1	272.1	16.875	5.73	9.35	1118.
22.	.01444	.6323	.8035	284.9	292.1	17.827	5.94	10.62	1063.
24.	.01504	.4952	.7500	307.3	314.9	18.818	6.08	12.25	998.
26.	.01584	.3527	.6746	333.6	341.5	19.882	6.19	14.61	912.
* 27.116	.01645	.2724	.6200	350.7	358.9	20.537	6.26	16.52	850.
* 27.116	.16290	.0528	.0296	646.2	727.6	34.141	7.00	18.92	378.
28.	.17542	.0614	.0270	655.7	743.4	34.714	6.84	17.03	391.
30.	.20054	.0780	.0229	674.7	775.0	35.803	6.64	14.78	417.
32.	.22323	.0923	.0203	691.6	803.2	36.717	6.53	13.52	439.
34.	.24452	.1051	.0183	707.5	829.7	37.520	6.45	12.90	458.
36.	.26489	.1171	.0167	722.6	855.0	38.243	6.39	12.41	477.
38.	.28462	.1285	.0154	737.2	879.5	38.905	6.36	12.07	494.
40.	.30387	.1394	.0144	751.4	903.4	39.517	6.33	11.81	510.
42.	.32275	.1500	.0135	765.4	926.8	40.088	6.32	11.61	525.
44.	.34133	.1603	.0127	779.2	949.9	40.624	6.30	11.46	540.
46.	.35967	.1703	.0120	792.8	972.7	41.131	6.29	11.33	554.
48.	.37782	.1802	.0114	806.3	995.2	41.611	6.29	11.22	567.
50.	.39579	.1899	.0108	819.7	1017.6	42.067	6.28	11.14	580.
55.	.44015	.2136	.0097	852.8	1072.8	43.121	6.29	10.99	611.
60.	.48388	.2366	.0088	885.6	1127.5	44.074	6.31	10.90	639.
65.	.52716	.2593	.0080	918.3	1181.9	44.943	6.35	10.86	666.
70.	.57010	.2816	.0074	951.1	1236.2	45.748	6.41	10.86	690.
75.	.61279	.3036	.0069	984.1	1290.5	46.498	6.49	10.88	714.
80.	.65527	.3254	.0064	1017.4	1345.1	47.202	6.58	10.94	736.
90.	.73977	.3687	.0057	1085.4	1455.3	48.501	6.81	11.12	776.
100.	.82383	.4115	.0051	1155.6	1567.6	49.683	7.08	11.35	812.
110.	.90757	.4540	.0046	1228.5	1682.3	50.773	7.37	11.61	845.
120.	.99107	.4962	.0042	1304.3	1799.8	51.796	7.67	11.89	877.
140.	1.15760	.5802	.0036	1464.2	2043.0	53.669	8.23	12.42	936.
160.	1.32371	.6638	.0031	1634.2	2296.0	55.357	8.70	12.88	991.
180.	1.48953	.7472	.0028	1812.7	2557.5	56.897	9.09	13.26	1044.
200.	1.65516	.8303	.0025	1998.2	2825.7	58.310	9.41	13.56	1094.
220.	1.82065	.9133	.0023	2189.2	3099.5	59.614	9.66	13.80	1143.
240.	1.98605	.9962	.0021	2384.5	3377.5	60.824	9.85	13.99	1190.
260.	2.15136	1.0790	.0019	2583.2	3658.9	61.951	10.00	14.14	1235.
280.	2.31662	1.1618	.0018	2784.5	3942.8	63.002	10.11	14.24	1280.
300.	2.48169	1.2445	.0017	2987.7	4228.6	63.987	10.19	14.32	1323.
350.	2.89453	1.4511	.0014	3500.6	4947.9	66.206	10.30	14.43	1426.
400.	3.30723	1.6576	.0013	4017.3	5670.9	68.137	10.35	14.48	1523.
450.	3.71985	1.8640	.0011	4535.8	6395.7	69.844	10.37	14.50	1614.
500.	4.13242	2.0703	.0010	5055.0	7121.2	71.371	10.39	14.52	1701.
550.	4.54495	2.2767	.0009	5574.8	7847.2	72.756	10.40	14.53	1783.
600.	4.95746	2.4830	.0008	6095.6	8574.4	74.018	10.42	14.55	1862.
650.	5.36994	2.6892	.0008	6617.3	9302.3	75.180	10.45	14.57	1937.
700.	5.78242	2.8955	.0007	7140.6	10031.8	76.268	10.48	14.60	2009.
750.	6.19488	3.1018	.0007	7665.9	10763.3	77.279	10.52	14.64	2078.
800.	6.60734	3.3080	.0006	8193.2	11496.9	78.226	10.57	14.69	2145.
850.	7.01979	3.5143	.0006	8723.4	12233.3	79.118	10.63	14.75	2209.
900.	7.43224	3.7205	.0006	9256.6	12972.8	79.963	10.70	14.82	2270.
950.	7.84468	3.9267	.0005	9793.3	13715.6	80.765	10.77	14.90	2330.
1000.	8.25712	4.1330	.0005	10333.8	14462.3	81.530	10.86	14.98	2388.
1100.	9.08198	4.5454	.0005	11429.2	15970.2	82.956	11.04	15.16	2499.
1200.	9.90685	4.9578	.0004	12544.0	17497.5	84.278	11.24	15.36	2603.
1300.	10.73170	5.3703	.0004	13679.6	19045.5	85.516	11.45	15.58	2703.
1400.	11.55656	5.7827	.0004	14836.8	20615.1	86.686	11.68	15.80	2797.
1500.	12.38145	6.1951	.0003	16016.1	22206.8	87.799	11.91	16.03	2888.
1600.	13.20641	6.6076	.0003	17217.1	23820.3	88.833	12.14	16.26	2975.
1700.	14.03155	7.0200	.0003	18442.1	25457.9	89.821	12.38	16.51	3059.
1800.	14.85713	7.4324	.0003	19693.5	27122.1	90.771	12.66	16.79	3140.
2000.	16.51165	8.2573	.0003	22297.0	30552.8	92.589	13.40	17.57	3290.
2200.	18.17829	9.0821	.0002	25098.7	34187.8	94.312	14.71	18.97	3422.
2400.	19.87583	9.9070	.0002	28269.2	38207.1	96.054	17.05	21.52	3535.
2600.	21.63989	10.7318	.0002	32091.0	42910.9	97.934	21.00	25.92	3638.
2800.	23.52951	11.5566	.0002	36981.9	48746.6	100.099	27.16	32.94	3740.
3000.	25.63286	12.3815	.0002	43497.1	56313.6	102.715	36.04	43.31	3853.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.50 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.968	77.2965	634.5	.25586	92.2941	.01007	74.59	257.88	.00054	1.25256	2.2082
14.	77.2625	639.9	.25557	93.1235	.00998	74.91	256.56	.00055	1.25244	2.1862
15.	76.4616	620.4	.24647	82.7270	.01118	83.62	225.71	.00057	1.24962	1.8716
16.	75.5862	623.1	.23499	76.6271	.01182	89.65	200.85	.00058	1.24655	1.6502
17.	74.6876	626.0	.22585	71.3910	.01248	93.67	181.04	.00058	1.24340	1.5095
18.	73.7238	623.1	.21812	65.8110	.01331	96.50	164.50	.00057	1.24003	1.4138
19.	72.7116	617.0	.21153	60.3138	.01427	98.16	150.63	.00055	1.23649	1.3513
20.	71.6412	607.7	.20563	54.8242	.01539	99.63	138.76	.00054	1.23276	1.3022
22.	69.2711	578.8	.19535	43.7989	.01834	102.25	119.14	.00050	1.22452	1.2373
24.	66.5013	537.8	.18538	32.9286	.02278	102.02	103.11	.00045	1.21494	1.2379
26.	63.1156	482.2	.17263	22.2624	.03030	99.09	88.98	.00039	1.20330	1.3120
* 27.116	60.7811	443.9	.16287	16.5588	.03744	96.11	81.33	.00034	1.19531	1.4065
* 27.116	6.1386	207.3	.06874	.3240	.09124	27.63	16.10	.00086	1.01862	1.1024
28.	5.7006	221.3	.06912	.3503	.07695	27.33	16.44	.00101	1.01728	1.0239
30.	4.9866	250.6	.06931	.3891	.05897	27.58	17.25	.00135	1.01511	.9245
32.	4.4797	278.0	.06923	.4133	.04901	28.47	18.10	.00168	1.01356	.8661
34.	4.0897	303.7	.06919	.4300	.04247	29.51	18.96	.00201	1.01238	.8287
36.	3.7752	328.6	.06920	.4422	.03778	30.64	19.81	.00235	1.01142	.8025
38.	3.5135	352.9	.06912	.4515	.03420	31.83	20.66	.00270	1.01063	.7831
40.	3.2909	376.9	.06900	.4588	.03134	33.06	21.49	.00306	1.00995	.7680
42.	3.0984	400.5	.06888	.4647	.02900	34.30	22.32	.00343	1.00937	.7559
44.	2.9297	423.8	.06874	.4696	.02703	35.54	23.14	.00381	1.00885	.7458
46.	2.7803	446.9	.06861	.4736	.02535	36.79	23.95	.00421	1.00840	.7373
48.	2.6468	469.8	.06847	.4769	.02389	38.04	24.74	.00461	1.00800	.7300
50.	2.5266	492.6	.06832	.4797	.02261	39.28	25.53	.00502	1.00763	.7239
55.	2.2719	549.5	.06789	.4852	.02000	42.31	27.44	.00610	1.00686	.7127
60.	2.0666	606.4	.06737	.4890	.01797	45.24	29.30	.00723	1.00624	.7058
65.	1.8970	664.1	.06672	.4918	.01635	48.30	31.10	.00844	1.00573	.6990
70.	1.7541	722.9	.06593	.4939	.01502	51.12	32.84	.00967	1.00529	.6974
75.	1.6319	783.3	.06502	.4954	.01389	53.93	34.54	.01093	1.00493	.6971
80.	1.5261	845.4	.06399	.4967	.01294	56.42	36.19	.01217	1.00461	.7018
90.	1.3518	976.0	.06164	.4984	.01139	62.92	39.39	.01507	1.00408	.6958
100.	1.2138	1114.4	.05917	.4995	.01018	68.86	42.44	.01800	1.00366	.6994
110.	1.1018	1260.5	.05671	.5002	.00921	76.70	44.82	.02158	1.00332	.6786
120.	1.0090	1412.4	.05445	.5007	.00842	83.26	47.65	.02499	1.00304	.6803
140.	.8639	1729.0	.05065	.5012	.00718	96.40	53.05	.03235	1.00261	.6834
160.	.7555	2054.3	.04781	.5015	.00627	109.43	58.19	.04050	1.00228	.6847
180.	.6714	2383.0	.04570	.5016	.00556	122.11	63.10	.04940	1.00202	.6850
200.	.6042	2711.5	.04414	.5016	.00500	134.28	67.83	.05901	1.00182	.6850
220.	.5493	3038.5	.04296	.5016	.00454	145.89	72.41	.06927	1.00166	.6852
240.	.5035	3361.5	.04210	.5016	.00416	156.93	76.85	.08018	1.00152	.6853
260.	.4648	3680.2	.04146	.5016	.00384	167.45	81.17	.09174	1.00140	.6853
280.	.4317	3994.1	.04099	.5015	.00357	177.48	85.39	.10392	1.00130	.6852
300.	.4030	4303.6	.04065	.5015	.00333	187.09	89.50	.11671	1.00121	.6851
350.	.3455	5060.9	.04017	.5013	.00285	209.57	99.42	.15130	1.00104	.6847
400.	.3024	5802.8	.03996	.5012	.00250	230.37	108.88	.18941	1.00091	.6844
450.	.2688	6536.2	.03987	.5011	.00222	250.00	117.96	.23090	1.00081	.6841
500.	.2420	7270.8	.03978	.5010	.00200	268.82	126.71	.27548	1.00073	.6843
550.	.2200	8004.6	.03972	.5009	.00182	287.08	135.19	.32326	1.00066	.6843
600.	.2017	8742.7	.03964	.5009	.00166	304.96	143.41	.37408	1.00061	.6842
650.	.1862	9485.1	.03955	.5008	.00154	322.58	151.42	.42797	1.00056	.6840
700.	.1729	10237.0	.03942	.5007	.00143	340.06	159.23	.48471	1.00052	.6839
750.	.1614	10997.5	.03926	.5007	.00133	357.45	166.87	.54435	1.00049	.6837
800.	.1513	11769.5	.03908	.5007	.00125	374.82	174.35	.60676	1.00046	.6835
850.	.1425	12554.5	.03886	.5006	.00118	392.20	181.69	.67183	1.00043	.6834
900.	.1345	13353.8	.03860	.5006	.00111	409.63	188.89	.73950	1.00041	.6834
950.	.1275	14168.3	.03833	.5006	.00105	427.13	195.98	.80967	1.00038	.6836
1000.	.1211	14998.5	.03802	.5005	.00100	444.72	202.95	.88228	1.00036	.6838
1100.	.1101	16695.9	.03740	.5005	.00091	475.56	216.59	1.02536	1.00033	.6906
1200.	.1009	18452.1	.03673	.5004	.00083	511.01	229.87	1.18626	1.00030	.6911
1300.	.0932	20266.7	.03604	.5004	.00077	546.93	242.83	1.35646	1.00028	.6916
1400.	.0865	22138.4	.03535	.5004	.00071	583.32	255.50	1.53585	1.00026	.6921
1500.	.0808	24066.8	.03466	.5004	.00067	620.30	267.90	1.72445	1.00024	.6925
1600.	.0757	26040.8	.03400	.5003	.00062	657.77	280.05	1.92269	1.00023	.6925
1700.	.0713	28087.9	.03333	.5003	.00059	696.78	291.97	2.13154	1.00021	.6919
1800.	.0673	30242.7	.03260	.5003	.00056	738.77	303.67	2.35300	1.00020	.6903
2000.	.0606	35148.4	.03079	.5001	.00050	842.45	326.45	2.84995	1.00018	.6809
2200.	.0550	41699.4	.02808	.4996	.00045	1004.56	345.01	3.46565	1.00017	.6515
2400.	.0503	51492.8	.02429	.4984	.00042	1285.48	366.63	4.27367	1.00015	.6138
2600.	.0462	66853.3	.01982	.4959	.00039	1772.03	388.25	5.32506	1.00014	.5680
2800.	.0425	90600.8	.01547	.4912	.00036	2569.10	410.36	6.60647	1.00013	.5261
3000.	.0390	125516.5	.01185	.4830	.00035	3780.36	433.60	8.05486	1.00012	.4967

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.55 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 13.985	.01293	1.1972	.9296	218.4	225.5	14.094	4.70	6.39	1276.
14.	.01294	1.2128	.9295	218.5	225.7	14.103	4.70	6.37	1282.
15.	.01307	1.0870	.9264	225.1	232.3	14.560	4.91	6.93	1239.
16.	.01322	1.0269	.9080	232.1	239.4	15.017	5.10	7.34	1216.
17.	.01338	.9610	.8923	239.6	247.0	15.478	5.28	7.80	1192.
18.	.01355	.8977	.8775	247.6	255.0	15.938	5.44	8.28	1168.
19.	.01374	.8347	.8623	256.0	263.6	16.400	5.59	8.79	1145.
20.	.01395	.7704	.8452	264.9	272.6	16.864	5.72	9.33	1121.
22.	.01442	.6376	.8052	284.6	292.5	17.814	5.94	10.59	1066.
24.	.01501	.5022	.7523	306.9	315.2	18.800	6.08	12.18	1003.
26.	.01581	.3597	.6780	333.0	341.7	19.858	6.19	14.49	918.
* 27.636	.01674	.2427	.5967	358.6	367.8	20.831	6.30	17.66	825.
* 27.636	.14714	.0500	.0331	644.6	725.5	33.781	7.07	20.19	378.
28.	.15228	.0540	.0317	648.9	732.7	34.039	6.98	19.07	384.
30.	.17696	.0725	.0264	669.7	767.0	35.223	6.72	15.74	412.
32.	.19860	.0878	.0230	687.5	796.8	36.185	6.58	14.21	435.
34.	.21862	.1013	.0206	704.0	824.2	37.018	6.49	13.30	456.
36.	.23763	.1138	.0188	719.5	850.2	37.761	6.42	12.71	475.
38.	.25595	.1256	.0173	734.4	875.2	38.437	6.38	12.30	492.
40.	.27375	.1368	.0161	748.9	899.5	39.060	6.35	12.00	509.
42.	.29117	.1476	.0150	763.1	923.3	39.639	6.33	11.77	524.
44.	.30828	.1581	.0141	777.1	946.6	40.182	6.31	11.59	539.
46.	.32515	.1684	.0133	790.8	969.7	40.694	6.30	11.45	553.
48.	.34181	.1784	.0127	804.4	992.4	41.178	6.30	11.33	567.
50.	.35829	.1883	.0120	817.9	1015.0	41.639	6.29	11.23	580.
55.	.39892	.2123	.0107	851.2	1070.6	42.701	6.30	11.06	610.
60.	.43891	.2356	.0097	884.2	1125.6	43.658	6.32	10.95	639.
65.	.47844	.2584	.0089	917.1	1180.2	44.531	6.36	10.90	666.
70.	.51763	.2809	.0082	950.0	1234.7	45.339	6.41	10.89	691.
75.	.55657	.3031	.0076	983.1	1289.2	46.091	6.49	10.91	714.
80.	.59530	.3250	.0071	1016.5	1343.9	46.797	6.58	10.96	736.
90.	.67230	.3685	.0063	1084.6	1454.4	48.099	6.81	11.14	776.
100.	.74886	.4114	.0056	1154.9	1566.8	49.283	7.08	11.36	812.
110.	.82509	.4540	.0051	1227.9	1681.7	50.375	7.38	11.63	846.
120.	.90110	.4964	.0046	1303.7	1799.3	51.398	7.67	11.90	877.
140.	1.05263	.5805	.0040	1463.7	2042.7	53.273	8.23	12.42	936.
160.	1.20373	.6642	.0035	1633.8	2295.8	54.962	8.70	12.88	991.
180.	1.35455	.7476	.0031	1812.4	2557.4	56.502	9.09	13.26	1044.
200.	1.50518	.8308	.0028	1997.9	2825.7	57.915	9.41	13.56	1094.
220.	1.65568	.9139	.0025	2188.9	3099.5	59.220	9.66	13.81	1143.
240.	1.80607	.9968	.0023	2384.3	3377.6	60.430	9.85	14.00	1190.
260.	1.95639	1.0797	.0021	2583.0	3659.1	61.557	10.00	14.14	1236.
280.	2.10665	1.1625	.0020	2784.3	3943.0	62.609	10.11	14.25	1280.
300.	2.25674	1.2452	.0018	2987.6	4228.8	63.594	10.19	14.32	1323.
350.	2.63208	1.4518	.0016	3500.5	4948.1	65.812	10.30	14.43	1426.
400.	3.00729	1.6584	.0014	4017.2	5671.2	67.744	10.35	14.48	1523.
450.	3.38242	1.8648	.0012	4535.7	6396.0	69.450	10.37	14.50	1615.
500.	3.75749	2.0712	.0011	5054.9	7121.5	70.978	10.39	14.52	1701.
550.	4.13253	2.2775	.0010	5574.7	7847.6	72.363	10.40	14.53	1783.
600.	4.50755	2.4838	.0009	6095.6	8574.7	73.625	10.42	14.55	1862.
650.	4.88254	2.6901	.0008	6617.3	9302.7	74.787	10.45	14.57	1937.
700.	5.25753	2.8964	.0008	7140.6	10032.2	75.875	10.48	14.60	2009.
750.	5.63250	3.1026	.0007	7665.9	10763.7	76.886	10.52	14.64	2078.
800.	6.00746	3.3089	.0007	8193.2	11497.3	77.833	10.57	14.69	2145.
850.	6.38242	3.5151	.0006	8723.4	12233.7	78.725	10.63	14.75	2209.
900.	6.75737	3.7214	.0006	9256.6	12973.2	79.569	10.70	14.82	2271.
950.	7.13232	3.9276	.0006	9793.3	13716.1	80.372	10.77	14.90	2330.
1000.	7.50727	4.1338	.0006	10333.7	14462.7	81.137	10.86	14.98	2388.
1100.	8.25715	4.5463	.0005	11429.2	15970.6	82.563	11.04	15.16	2499.
1200.	9.00703	4.9587	.0005	12544.0	17497.9	83.885	11.24	15.36	2604.
1300.	9.75690	5.3712	.0004	13679.6	19045.9	85.123	11.45	15.58	2703.
1400.	10.50677	5.7836	.0004	14836.8	20615.5	86.293	11.68	15.80	2798.
1500.	11.25667	6.1960	.0004	16016.1	22207.2	87.405	11.91	16.03	2888.
1600.	12.00663	6.6085	.0003	17217.0	23820.7	88.440	12.14	16.26	2976.
1700.	12.75675	7.0209	.0003	18441.8	25458.0	89.428	12.38	16.51	3060.
1800.	13.50724	7.4333	.0003	19692.7	27121.7	90.378	12.65	16.79	3140.
2000.	15.01115	8.2582	.0003	22293.3	30549.4	92.194	13.38	17.55	3290.
2200.	16.52556	9.0830	.0003	25085.9	34175.0	93.913	14.64	18.89	3423.
2400.	18.06676	9.9079	.0002	28233.1	38169.9	95.644	16.88	21.34	3538.
2600.	19.66561	10.7327	.0002	32004.1	42820.2	97.503	20.66	25.55	3641.
2800.	21.37332	11.5575	.0002	36797.0	48552.3	99.629	26.56	32.25	3743.
3000.	23.26633	12.3824	.0002	43141.3	55937.8	102.182	35.05	42.15	3855.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.55 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DV)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 13.985	77.3248	636.2	.25579	92.5755	.01004	74.80	258.19	.00055	1.25266	2.2050
14.	77.3044	642.7	.25564	93.7544	.00991	74.95	257.46	.00055	1.25259	2.1890
15.	76.5060	622.0	.24685	83.1601	.01114	83.68	226.49	.00057	1.24978	1.8753
16.	75.6549	628.1	.23547	77.6879	.01169	89.76	201.83	.00058	1.24679	1.6508
17.	74.7391	627.8	.22617	71.8206	.01242	93.77	181.65	.00058	1.24358	1.5111
18.	73.7793	625.0	.21843	66.2301	.01325	96.61	165.06	.00057	1.24022	1.4148
19.	72.7713	619.2	.21183	60.7395	.01420	98.29	151.14	.00055	1.23670	1.3517
20.	71.7056	609.9	.20593	55.2433	.01530	99.78	139.23	.00054	1.23298	1.3021
22.	69.3493	581.4	.19562	44.2157	.01821	102.43	119.58	.00050	1.22479	1.2359
24.	66.6035	541.5	.18570	33.4473	.02249	102.26	103.55	.00045	1.21529	1.2333
26.	63.2551	486.4	.17318	22.7511	.02980	99.42	89.45	.00039	1.20377	1.3041
* 27.636	59.7376	429.1	.15856	14.4957	.04116	94.80	78.30	.00032	1.19175	1.4587
* 27.636	6.7960	207.2	.06897	.3400	.09741	28.92	16.56	.00076	1.02063	1.1558
28.	6.5668	213.4	.06916	.3548	.08939	28.63	16.68	.00082	1.01993	1.1111
30.	5.6511	244.4	.06949	.4096	.06440	28.32	17.43	.00115	1.01713	.9689
32.	5.0353	272.7	.06943	.4419	.05210	29.02	18.25	.00146	1.01525	.8934
34.	4.5741	299.1	.06943	.4634	.04447	29.96	19.09	.00177	1.01385	.8474
36.	4.2082	324.4	.06946	.4789	.03918	31.03	19.93	.00209	1.01274	.8162
38.	3.9071	349.1	.06939	.4906	.03523	32.18	20.76	.00241	1.01182	.7937
40.	3.6529	373.4	.06926	.4997	.03214	33.37	21.59	.00274	1.01105	.7765
42.	3.4344	397.3	.06913	.5070	.02963	34.58	22.41	.00308	1.01039	.7629
44.	3.2438	420.9	.06898	.5130	.02754	35.81	23.22	.00343	1.00981	.7517
46.	3.0755	444.2	.06883	.5179	.02576	37.05	24.03	.00379	1.00930	.7423
48.	2.9256	467.4	.06868	.5220	.02423	38.28	24.82	.00416	1.00884	.7343
50.	2.7910	490.4	.06852	.5255	.02290	39.51	25.60	.00454	1.00843	.7276
55.	2.5068	547.6	.06806	.5321	.02019	42.51	27.51	.00552	1.00757	.7155
60.	2.2784	604.9	.06752	.5368	.01811	45.42	29.35	.00655	1.00688	.7078
65.	2.0901	662.8	.06687	.5401	.01645	48.47	31.15	.00766	1.00631	.7006
70.	1.9319	721.8	.06607	.5426	.01509	51.28	32.89	.00877	1.00583	.6986
75.	1.7967	782.3	.06514	.5445	.01395	54.07	34.59	.00993	1.00542	.6982
80.	1.6798	844.6	.06410	.5460	.01298	56.55	36.24	.01105	1.00507	.7027
90.	1.4874	975.4	.06173	.5481	.01142	63.04	39.42	.01370	1.00449	.6964
100.	1.3354	1114.0	.05925	.5494	.01020	68.97	42.47	.01636	1.00403	.6998
110.	1.2120	1260.3	.05678	.5502	.00922	76.75	44.84	.01961	1.00366	.6791
120.	1.1098	1412.3	.05451	.5508	.00842	83.30	47.66	.02271	1.00335	.6807
140.	.9500	1729.1	.05070	.5515	.00719	96.43	53.06	.02941	1.00287	.6837
160.	.8308	2054.6	.04785	.5518	.00627	109.46	58.19	.03682	1.00251	.6849
180.	.7383	2383.5	.04573	.5519	.00556	122.13	63.11	.04491	1.00223	.6852
200.	.6644	2712.1	.04417	.5520	.00500	134.30	67.84	.05365	1.00200	.6851
220.	.6040	3039.3	.04299	.5520	.00454	145.91	72.41	.06298	1.00182	.6853
240.	.5537	3362.4	.04212	.5519	.00416	156.95	76.86	.07291	1.00167	.6853
260.	.5111	3681.1	.04148	.5519	.00384	167.46	81.18	.08342	1.00154	.6854
280.	.4747	3995.2	.04101	.5518	.00357	177.50	85.39	.09450	1.00143	.6853
300.	.4431	4304.8	.04067	.5518	.00333	187.10	89.50	.10613	1.00134	.6852
350.	.3799	5062.1	.04018	.5516	.00285	209.58	99.42	.13758	1.00115	.6847
400.	.3325	5804.1	.03997	.5514	.00250	230.38	108.88	.17223	1.00100	.6844
450.	.2956	6537.6	.03988	.5513	.00222	250.01	117.96	.20995	1.00089	.6841
500.	.2661	7272.2	.03979	.5512	.00200	268.83	126.72	.25048	1.00080	.6843
550.	.2420	8006.1	.03973	.5511	.00181	287.09	135.19	.29393	1.00073	.6843
600.	.2219	8744.1	.03965	.5510	.00166	304.96	143.42	.34013	1.00067	.6842
650.	.2048	9486.6	.03956	.5510	.00154	322.59	151.42	.38912	1.00062	.6840
700.	.1902	10238.4	.03943	.5509	.00143	340.06	159.24	.44071	1.00057	.6839
750.	.1775	10999.0	.03927	.5508	.00133	357.46	166.87	.49494	1.00054	.6837
800.	.1665	11771.1	.03908	.5508	.00125	374.82	174.35	.55167	1.00050	.6835
850.	.1567	12556.1	.03886	.5508	.00117	392.21	181.69	.61083	1.00047	.6834
900.	.1480	13355.3	.03861	.5507	.00111	409.63	188.90	.67235	1.00045	.6834
950.	.1402	14169.8	.03833	.5507	.00105	427.13	195.98	.73614	1.00042	.6836
1000.	.1332	15000.1	.03803	.5506	.00100	444.72	202.95	.80216	1.00040	.6838
1100.	.1211	16697.5	.03740	.5506	.00091	475.56	216.59	.93223	1.00036	.6906
1200.	.1110	18453.8	.03673	.5505	.00083	511.01	229.87	1.07851	1.00033	.6911
1300.	.1025	20268.3	.03604	.5505	.00077	546.92	242.83	1.23325	1.00031	.6916
1400.	.0952	22139.8	.03535	.5505	.00071	583.32	255.50	1.39633	1.00029	.6921
1500.	.0888	24067.8	.03466	.5504	.00067	620.27	267.90	1.56777	1.00027	.6925
1600.	.0833	26040.4	.03400	.5504	.00062	657.69	280.05	1.74794	1.00025	.6925
1700.	.0784	28084.2	.03334	.5504	.00059	696.57	291.97	1.93766	1.00024	.6920
1800.	.0740	30231.9	.03262	.5503	.00056	738.28	303.67	2.13868	1.00022	.6904
2000.	.0666	35098.5	.03085	.5501	.00050	840.46	326.45	2.58867	1.00020	.6815
2200.	.0605	41538.1	.02822	.5496	.00045	998.31	345.00	3.14346	1.00018	.6529
2400.	.0554	51072.6	.02452	.5484	.00042	1269.43	366.61	3.86858	1.00017	.6164
2600.	.0509	65922.3	.02013	.5458	.00039	1736.76	388.19	4.81201	1.00015	.5711
2800.	.0468	88789.4	.01581	.5407	.00036	2500.82	410.22	5.96600	1.00014	.5291
3000.	.0430	122366.2	.01217	.5322	.00034	3662.01	433.34	7.27649	1.00013	.4988

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.60 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	14.001	.01293	1.2078	.9302	218.4	226.2	14.096	4.70	6.38	1280.
	15.	.01306	1.0920	.9281	225.0	232.8	14.553	4.90	6.92	1242.
	16.	.01321	1.0321	.9095	232.0	239.9	15.010	5.10	7.33	1219.
	17.	.01337	.9660	.8938	239.5	247.5	15.469	5.28	7.79	1194.
	18.	.01354	.9027	.8790	247.4	255.5	15.929	5.44	8.27	1171.
	19.	.01373	.8398	.8638	255.8	264.1	16.390	5.59	8.77	1148.
	20.	.01393	.7755	.8468	264.7	273.1	16.854	5.72	9.31	1123.
	22.	.01440	.6428	.8069	284.3	292.9	17.801	5.93	10.56	1069.
	24.	.01499	.5082	.7545	306.5	315.5	18.783	6.08	12.12	1007.
	26.	.01577	.3665	.6813	332.4	341.9	19.835	6.19	14.38	923.
	28.	.01694	.2216	.5810	364.1	374.2	21.031	6.32	18.56	807.
*	28.123	.01704	.2190	.5735	366.3	376.6	21.114	6.34	18.60	802.
*	28.123	.13376	.0472	.0369	642.7	722.9	33.437	7.13	21.64	378.
	30.	.15699	.0666	.0302	664.2	758.4	34.660	6.81	16.93	407.
	32.	.17792	.0831	.0260	683.2	790.0	35.679	6.64	14.88	431.
	34.	.19695	.0974	.0231	700.4	818.5	36.546	6.53	13.74	453.
	36.	.21486	.1104	.0209	716.4	845.3	37.310	6.45	13.03	472.
	38.	.23202	.1226	.0192	731.6	870.8	38.001	6.40	12.55	490.
	40.	.24864	.1342	.0178	746.4	895.6	38.635	6.36	12.20	507.
	42.	.26485	.1453	.0166	760.8	919.7	39.223	6.34	11.93	523.
	44.	.28074	.1560	.0156	774.9	943.3	39.773	6.32	11.73	538.
	46.	.29637	.1665	.0147	788.8	966.6	40.291	6.31	11.56	552.
	48.	.31179	.1767	.0139	802.5	989.6	40.780	6.30	11.43	566.
	50.	.32704	.1867	.0132	816.1	1012.4	41.245	6.30	11.32	579.
	55.	.36456	.2110	.0118	849.7	1068.4	42.314	6.30	11.13	610.
	60.	.40143	.2346	.0107	882.9	1123.7	43.277	6.32	11.01	639.
	65.	.43784	.2576	.0097	915.9	1178.6	44.154	6.36	10.94	666.
	70.	.47391	.2802	.0090	948.9	1233.3	44.965	6.42	10.93	691.
	75.	.50972	.3025	.0083	982.1	1287.9	45.719	6.49	10.94	714.
	80.	.54533	.3246	.0078	1015.6	1342.8	46.427	6.58	10.99	736.
	90.	.61608	.3682	.0068	1083.8	1453.4	47.731	6.82	11.16	776.
	100.	.68639	.4113	.0061	1154.2	1566.1	48.917	7.08	11.38	813.
	110.	.75637	.4541	.0055	1227.3	1681.1	50.010	7.38	11.64	846.
	120.	.82612	.4965	.0051	1303.2	1798.8	51.035	7.67	11.91	878.
	140.	.96515	.5808	.0043	1463.2	2042.3	52.911	8.23	12.43	937.
	160.	1.10375	.6646	.0038	1633.4	2295.7	54.600	8.70	12.89	992.
	180.	1.24207	.7481	.0034	1812.0	2557.3	56.141	9.10	13.26	1044.
	200.	1.38020	.8314	.0030	1997.6	2825.7	57.555	9.41	13.57	1095.
	220.	1.51820	.9145	.0027	2188.7	3099.6	58.860	9.66	13.81	1143.
	240.	1.65609	.9975	.0025	2384.1	3377.7	60.070	9.85	14.00	1190.
	260.	1.79391	1.0804	.0023	2582.8	3659.2	61.197	10.00	14.14	1236.
	280.	1.93167	1.1632	.0021	2784.1	3943.1	62.249	10.11	14.25	1280.
	300.	2.06928	1.2459	.0020	2987.4	4229.0	63.234	10.19	14.32	1324.
	350.	2.41338	1.4526	.0017	3500.4	4948.4	65.453	10.30	14.44	1427.
	400.	2.75734	1.6592	.0015	4017.1	5671.5	67.384	10.35	14.48	1523.
	450.	3.10122	1.8656	.0013	4535.6	6396.3	69.091	10.37	14.50	1615.
	500.	3.44506	2.0720	.0012	5054.8	7121.9	70.619	10.39	14.52	1701.
	550.	3.78885	2.2783	.0011	5574.7	7848.0	72.004	10.40	14.53	1784.
	600.	4.13262	2.4847	.0010	6095.5	8575.1	73.266	10.42	14.55	1862.
	650.	4.47637	2.6909	.0009	6617.2	9303.1	74.428	10.45	14.57	1937.
	700.	4.82011	2.8972	.0009	7140.6	10032.6	75.516	10.48	14.60	2009.
	750.	5.16384	3.1035	.0008	7665.8	10764.1	76.527	10.52	14.64	2079.
	800.	5.50756	3.3097	.0008	8193.2	11497.7	77.474	10.57	14.69	2145.
	850.	5.85128	3.5160	.0007	8723.3	12234.1	78.366	10.63	14.75	2209.
	900.	6.19499	3.7222	.0007	9256.6	12973.6	79.211	10.70	14.82	2271.
	950.	6.53869	3.9285	.0006	9793.3	13716.5	80.013	10.77	14.90	2331.
	1000.	6.88239	4.1347	.0006	10333.7	14463.2	80.778	10.86	14.98	2389.
	1100.	7.56979	4.5472	.0005	11429.2	15971.0	82.204	11.04	15.16	2499.
	1200.	8.25718	4.9596	.0005	12544.0	17498.3	83.526	11.24	15.36	2604.
	1300.	8.94456	5.3721	.0005	13679.6	19046.3	84.764	11.45	15.58	2703.
	1400.	9.63195	5.7845	.0004	14836.8	20615.9	85.934	11.68	15.80	2798.
	1500.	10.31935	6.1969	.0004	16016.0	22207.6	87.047	11.91	16.03	2888.
	1600.	11.00681	6.6094	.0004	17216.9	23821.0	88.081	12.14	16.26	2976.
	1700.	11.69441	7.0218	.0004	18441.5	25458.1	89.069	12.38	16.51	3060.
	1800.	12.38234	7.4342	.0003	19692.0	27121.4	90.018	12.65	16.78	3141.
	2000.	13.76076	8.2591	.0003	22290.0	30546.5	91.833	13.36	17.52	3291.
	2200.	15.14840	9.0839	.0003	25074.8	34163.8	93.548	14.58	18.83	3424.
	2400.	16.55955	9.9088	.0003	28201.7	38137.4	95.270	16.74	21.19	3540.
	2600.	18.02131	10.7336	.0002	31928.3	42741.1	97.111	20.37	25.23	3644.
	2800.	19.57860	11.5584	.0002	36635.7	48382.9	99.204	26.03	31.65	3746.
	3000.	21.29856	12.3833	.0002	42830.8	55610.0	101.702	34.18	41.14	3857.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.60 MPA ISOBAR

	TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CJ M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
*	14.001	77.3529	640.6	.25573	93.4243	.00996	75.01	258.50	.00055	1.25276	2.1983
	15.	76.5504	623.6	.24723	83.5919	.01110	83.73	227.26	.00057	1.24994	1.8790
	16.	75.7022	630.0	.23579	78.1349	.01164	89.83	202.51	.00058	1.24696	1.6530
	17.	74.7902	629.7	.22649	72.2485	.01237	93.86	182.26	.00058	1.24376	1.5127
	18.	73.8345	627.0	.21873	66.6472	.01319	96.73	165.61	.00057	1.24041	1.4158
	19.	72.8306	621.3	.21212	61.1633	.01412	98.41	151.65	.00055	1.23691	1.3521
	20.	71.7697	612.1	.20621	55.6607	.01521	99.92	139.71	.00054	1.23321	1.3020
	22.	69.4268	583.9	.19588	44.6299	.01808	102.62	120.02	.00050	1.22506	1.2346
	24.	66.7023	544.7	.18601	33.8976	.02226	102.50	103.99	.00046	1.21563	1.2299
	26.	63.3921	490.4	.17372	23.2325	.02933	99.74	89.93	.00039	1.20424	1.2967
	28.	59.0308	417.9	.15564	13.0801	.04442	93.92	76.36	.00031	1.18935	1.5092
*	28.123	58.6975	416.7	.15422	12.8519	.04462	93.42	75.48	.00031	1.18821	1.5024
*	28.123	7.4761	207.0	.06917	.3528	.10454	30.27	17.01	.00067	1.02271	1.2160
	30.	6.3700	238.0	.06964	.4245	.07115	29.18	17.64	.00097	1.01933	1.0231
	32.	5.6207	267.4	.06962	.4671	.05565	29.63	18.41	.00128	1.01704	.9246
	34.	5.0773	294.4	.06966	.4946	.04667	30.44	19.22	.00157	1.01538	.8679
	36.	4.6542	320.2	.06972	.5140	.04069	31.44	20.05	.00187	1.01409	.8309
	38.	4.3100	345.3	.06966	.5285	.03633	32.53	20.87	.00217	1.01305	.8049
	40.	4.0220	370.0	.06953	.5397	.03297	33.69	21.69	.00247	1.01217	.7853
	42.	3.7758	394.2	.06938	.5486	.03028	34.88	22.51	.00279	1.01142	.7701
	44.	3.5621	418.0	.06922	.5558	.02806	36.08	23.31	.00311	1.01077	.7577
	46.	3.3742	441.6	.06906	.5617	.02619	37.30	24.11	.00344	1.01020	.7474
	48.	3.2072	464.9	.06889	.5667	.02458	38.52	24.90	.00378	1.00970	.7388
	50.	3.0577	488.1	.06872	.5708	.02319	39.73	25.67	.00413	1.00924	.7315
	55.	2.7430	545.8	.06824	.5788	.02038	42.71	27.57	.00504	1.00829	.7183
	60.	2.4911	603.3	.06768	.5843	.01824	45.61	29.42	.00599	1.00753	.7100
	65.	2.2839	661.5	.06701	.5883	.01655	48.63	31.21	.00700	1.00690	.7023
	70.	2.1101	720.7	.06620	.5913	.01516	51.43	32.94	.00803	1.00637	.6999
	75.	1.9618	781.4	.06526	.5935	.01401	54.20	34.63	.00909	1.00592	.6993
	80.	1.8338	843.8	.06421	.5953	.01303	56.68	36.28	.01012	1.00554	.7036
	90.	1.6232	974.8	.06183	.5977	.01144	63.16	39.46	.01256	1.00490	.6970
	100.	1.4569	1113.6	.05933	.5993	.01022	69.08	42.51	.01500	1.00440	.7002
	110.	1.3221	1260.1	.05684	.6003	.00924	76.81	44.85	.01797	1.00399	.6795
	120.	1.2105	1412.2	.05457	.6010	.00843	83.35	47.67	.02082	1.00365	.6810
	140.	1.0361	1729.2	.05074	.6018	.00719	96.47	53.07	.02696	1.00313	.6839
	160.	.9060	2054.9	.04788	.6022	.00627	109.49	58.20	.03376	1.00273	.6850
	180.	.8051	2384.0	.04576	.6023	.00556	122.16	63.11	.04118	1.00243	.6853
	200.	.7245	2712.8	.04420	.6024	.00500	134.32	67.84	.04919	1.00218	.6852
	220.	.6587	3040.1	.04301	.6024	.00454	145.92	72.42	.05775	1.00199	.6854
	240.	.6038	3363.3	.04214	.6023	.00416	156.96	76.86	.06686	1.00182	.6854
	260.	.5574	3682.1	.04150	.6022	.00384	167.48	81.18	.07649	1.00168	.6854
	280.	.5177	3996.2	.04103	.6022	.00357	177.51	85.39	.08664	1.00156	.6854
	300.	.4833	4305.9	.04068	.6021	.00333	187.12	89.51	.09731	1.00146	.6852
	350.	.4144	5063.3	.04020	.6019	.00285	209.59	99.42	.12615	1.00125	.6848
	400.	.3627	5805.4	.03998	.6017	.00249	230.39	108.88	.15792	1.00109	.6844
	450.	.3225	6539.0	.03989	.6016	.00222	250.02	117.96	.19250	1.00097	.6842
	500.	.2903	7273.6	.03980	.6014	.00200	268.83	126.72	.22966	1.00087	.6843
	550.	.2639	8007.5	.03974	.6013	.00181	287.09	135.19	.25948	1.00080	.6843
	600.	.2420	8745.6	.03966	.6012	.00166	304.97	143.42	.31184	1.00073	.6842
	650.	.2234	9488.0	.03956	.6011	.00154	322.59	151.42	.35675	1.00067	.6840
	700.	.2075	10239.9	.03943	.6011	.00143	340.07	159.24	.40405	1.00063	.6839
	750.	.1937	11000.5	.03928	.6010	.00133	357.46	166.87	.45375	1.00058	.6837
	800.	.1816	11772.6	.03909	.6009	.00125	374.83	174.35	.50577	1.00055	.6835
	850.	.1709	12557.6	.03887	.6009	.00117	392.21	181.69	.56000	1.00051	.6834
	900.	.1614	13356.9	.03861	.6008	.00111	409.64	188.90	.61639	1.00049	.6834
	950.	.1529	14171.4	.03833	.6008	.00105	427.14	195.98	.67488	1.00046	.6836
	1000.	.1453	15001.7	.03803	.6008	.00100	444.72	202.95	.73539	1.00044	.6838
	1100.	.1321	16699.1	.03740	.6007	.00091	475.56	216.59	.85463	1.00040	.6906
	1200.	.1211	18455.4	.03674	.6006	.00083	511.01	229.87	.98872	1.00036	.6911
	1300.	.1118	20269.9	.03605	.6006	.00077	546.92	242.83	1.13057	1.00034	.6916
	1400.	.1038	22141.3	.03535	.6006	.00071	583.31	255.50	1.28006	1.00031	.6921
	1500.	.0969	24068.9	.03467	.6005	.00067	620.24	267.90	1.43720	1.00029	.6925
	1600.	.0909	26040.3	.03401	.6005	.00062	657.61	280.05	1.60232	1.00027	.6926
	1700.	.0855	28081.2	.03335	.6004	.00059	696.38	291.97	1.77613	1.00026	.6921
	1800.	.0808	30222.7	.03264	.6004	.00056	737.85	303.67	1.96015	1.00024	.6906
	2000.	.0727	35055.2	.03090	.6002	.00050	838.71	326.45	2.37121	1.00022	.6820
	2200.	.0660	41397.5	.02833	.5997	.00045	992.86	344.99	2.87579	1.00020	.6542
	2400.	.0604	50706.3	.02473	.5984	.00042	1255.44	366.59	3.53275	1.00018	.6186
	2600.	.0555	65109.8	.02041	.5956	.00039	1705.97	388.13	4.38724	1.00017	.5740
	2800.	.0511	87207.1	.01612	.5904	.00036	2441.16	410.10	5.43565	1.00015	.5318
	3000.	.0470	119609.2	.01246	.5814	.00034	3558.42	433.10	6.63130	1.00014	.5008

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.65 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.018	.01292	1.2111	.9307	218.5	226.9	14.097	4.70	6.38	1281.
15.	.01306	1.0970	.9298	224.9	233.4	14.546	4.90	6.92	1244.
16.	.01320	1.0374	.9110	231.9	240.4	15.002	5.09	7.32	1221.
17.	.01336	.9711	.8953	239.3	248.0	15.461	5.27	7.78	1197.
18.	.01353	.9076	.8805	247.3	256.0	15.920	5.44	8.26	1174.
19.	.01372	.8449	.8653	255.6	264.6	16.380	5.59	8.76	1151.
20.	.01392	.7806	.8484	264.5	273.6	16.843	5.72	9.29	1126.
22.	.01439	.6480	.8086	284.0	293.4	17.788	5.93	10.53	1072.
24.	.01497	.5141	.7567	306.2	315.9	18.767	6.08	12.07	1010.
26.	.01574	.3746	.6847	331.8	342.1	19.812	6.19	14.25	929.
28.	.01688	.2291	.5862	363.1	374.1	20.994	6.32	18.28	814.
* 28.583	.01734	.1892	.5511	374.0	385.3	21.390	6.37	20.18	774.
* 28.583	.12221	.0443	.0409	640.5	719.9	33.105	7.20	23.32	378.
30.	.13972	.0604	.0345	658.3	749.1	34.103	6.91	18.46	402.
32.	.16025	.0783	.0292	678.7	782.9	35.193	6.71	15.66	428.
34.	.17853	.0934	.0257	696.6	812.7	36.097	6.57	14.23	450.
36.	.19554	.1070	.0232	713.1	840.2	36.885	6.47	13.37	470.
38.	.21174	.1196	.0212	728.7	866.4	37.592	6.42	12.81	489.
40.	.22736	.1315	.0196	743.8	891.6	38.238	6.38	12.40	506.
42.	.24256	.1429	.0182	758.4	916.1	38.835	6.35	12.10	522.
44.	.25742	.1539	.0171	772.7	940.0	39.393	6.34	11.87	537.
46.	.27202	.1646	.0161	786.8	963.6	39.916	6.32	11.69	551.
48.	.28640	.1749	.0152	800.6	986.8	40.410	6.31	11.54	565.
50.	.30060	.1851	.0145	814.4	1009.7	40.879	6.31	11.41	579.
55.	.33549	.2097	.0129	848.1	1066.2	41.956	6.31	11.20	610.
60.	.36972	.2335	.0116	881.5	1121.8	42.924	6.33	11.06	639.
65.	.40350	.2568	.0106	914.7	1176.9	43.805	6.36	10.99	666.
70.	.43692	.2796	.0097	947.8	1231.8	44.619	6.42	10.96	691.
75.	.47009	.3020	.0090	981.1	1286.6	45.376	6.50	10.98	714.
80.	.50305	.3242	.0084	1014.7	1341.6	46.085	6.59	11.02	736.
90.	.56851	.3680	.0074	1083.0	1452.5	47.392	6.82	11.17	777.
100.	.63353	.4113	.0066	1153.5	1565.3	48.580	7.09	11.39	813.
110.	.69822	.4541	.0060	1226.7	1680.5	49.674	7.38	11.65	847.
120.	.76268	.4967	.0055	1302.6	1798.4	50.700	7.67	11.92	878.
140.	.89113	.5811	.0047	1462.8	2042.0	52.578	8.23	12.44	937.
160.	1.01915	.6651	.0041	1633.0	2295.5	54.268	8.71	12.89	992.
180.	1.14690	.7486	.0036	1811.7	2557.2	55.809	9.10	13.27	1045.
200.	1.27445	.8319	.0033	1997.3	2825.7	57.223	9.41	13.57	1095.
220.	1.40187	.9151	.0030	2188.4	3099.6	58.529	9.66	13.81	1144.
240.	1.52919	.9981	.0027	2383.8	3377.8	59.739	9.85	14.00	1191.
260.	1.65643	1.0810	.0025	2582.6	3659.3	60.866	10.00	14.14	1237.
280.	1.78362	1.1639	.0023	2784.0	3943.3	61.918	10.11	14.25	1281.
300.	1.91066	1.2466	.0022	2987.3	4229.2	62.904	10.19	14.33	1324.
350.	2.22832	1.4534	.0019	3500.3	4948.7	65.123	10.30	14.44	1427.
400.	2.54585	1.6600	.0016	4017.0	5671.8	67.054	10.35	14.48	1524.
450.	2.86329	1.8664	.0014	4535.5	6396.7	68.761	10.37	14.50	1615.
500.	3.18069	2.0728	.0013	5054.8	7122.2	70.289	10.39	14.52	1702.
550.	3.49805	2.2792	.0012	5574.6	7848.3	71.674	10.40	14.53	1784.
600.	3.81538	2.4855	.0011	6095.5	8575.5	72.936	10.42	14.55	1863.
650.	4.13269	2.6918	.0010	6617.2	9303.5	74.098	10.45	14.57	1938.
700.	4.45000	2.8981	.0009	7140.5	10033.0	75.186	10.48	14.60	2010.
750.	4.76729	3.1044	.0009	7665.8	10764.5	76.197	10.52	14.64	2079.
800.	5.08457	3.3106	.0008	8193.2	11498.1	77.144	10.57	14.69	2145.
850.	5.40185	3.5169	.0008	8723.3	12234.5	78.036	10.63	14.75	2209.
900.	5.71912	3.7231	.0007	9256.6	12974.0	78.880	10.70	14.82	2271.
950.	6.03639	3.9293	.0007	9793.2	13716.9	79.683	10.77	14.90	2331.
1000.	6.35365	4.1356	.0007	10333.7	14463.6	80.448	10.86	14.98	2389.
1100.	6.98817	4.5480	.0006	11429.1	15971.5	81.874	11.04	15.16	2499.
1200.	7.62269	4.9605	.0005	12544.0	17498.7	83.196	11.24	15.36	2604.
1300.	8.25720	5.3729	.0005	13679.6	19046.8	84.434	11.45	15.58	2703.
1400.	8.89171	5.7854	.0005	14836.7	20616.4	85.604	11.68	15.80	2798.
1500.	9.52624	6.1978	.0004	16016.0	22208.0	86.716	11.91	16.03	2889.
1600.	10.16081	6.6102	.0004	17216.8	23821.3	87.751	12.14	16.26	2976.
1700.	10.79551	7.0227	.0004	18441.2	25458.3	88.739	12.38	16.50	3060.
1800.	11.43050	7.4351	.0004	19691.4	27121.2	89.688	12.64	16.77	3141.
2000.	12.70276	8.2600	.0003	22287.2	30544.0	91.501	13.34	17.50	3292.
2200.	13.98319	9.0848	.0003	25064.9	34154.0	93.213	14.53	18.77	3425.
2400.	15.28448	9.9096	.0003	28174.0	38108.9	94.927	16.62	21.05	3542.
2600.	16.63065	10.7345	.0003	31861.5	42671.4	96.751	20.12	24.94	3646.
2800.	18.06156	11.5593	.0002	36493.4	48233.4	98.814	25.57	31.13	3748.
3000.	19.63675	12.3842	.0002	42556.9	55320.8	101.265	33.41	40.25	3858.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.65 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.018	77.3811	642.3	.25567	93.7175	.00993	75.21	258.81	.00055	1.25286	2.1951
15.	76.5945	625.1	.24760	84.0224	.01107	83.79	228.04	.00057	1.25009	1.8828
16.	75.7493	631.8	.23611	78.5805	.01159	89.91	203.19	.00058	1.24712	1.6553
17.	74.8411	631.5	.22680	72.6747	.01232	93.95	182.88	.00058	1.24394	1.5143
18.	73.8894	628.9	.21903	67.0624	.01313	96.84	166.17	.00057	1.24061	1.4168
19.	72.8896	623.3	.21240	61.5851	.01405	98.54	152.16	.00056	1.23711	1.3525
20.	71.8334	614.3	.20650	56.0762	.01513	100.06	140.19	.00054	1.23343	1.3020
22.	69.5037	586.3	.19614	45.0414	.01795	102.80	120.45	.00051	1.22533	1.2334
24.	66.8000	547.8	.18632	34.3438	.02203	102.74	104.42	.00046	1.21597	1.2266
26.	63.5279	495.2	.17423	23.8007	.02877	100.07	90.40	.00040	1.20471	1.2869
28.	59.2493	423.3	.15662	13.5744	.04319	94.41	76.94	.00031	1.19009	1.4898
* 28.583	57.6537	399.3	.14999	10.9068	.05053	91.98	72.83	.00028	1.18467	1.5975
* 28.583	8.1825	206.6	.06934	.3622	.11285	31.70	17.47	.00060	1.02487	1.2848
30.	7.1571	231.3	.06975	.4324	.07982	30.23	17.87	.00082	1.02173	1.0912
32.	6.2403	262.0	.06980	.4886	.05979	30.30	18.59	.00112	1.01893	.9607
34.	5.6013	289.8	.06988	.5234	.04912	30.96	19.37	.00140	1.01698	.8907
36.	5.1140	316.0	.06999	.5474	.04232	31.86	20.17	.00168	1.01549	.8468
38.	4.7228	341.6	.06993	.5650	.03750	32.91	20.99	.00196	1.01430	.8168
40.	4.3983	366.5	.06980	.5786	.03384	34.03	21.80	.00225	1.01332	.7946
42.	4.1228	391.1	.06964	.5893	.03095	35.18	22.60	.00254	1.01248	.7776
44.	3.8847	415.2	.06946	.5979	.02859	36.36	23.40	.00284	1.01175	.7640
46.	3.6762	439.0	.06929	.6049	.02662	37.56	24.19	.00315	1.01112	.7527
48.	3.4916	462.6	.06911	.6108	.02494	38.76	24.97	.00346	1.01056	.7433
50.	3.3267	485.9	.06892	.6158	.02349	39.96	25.75	.00379	1.01006	.7354
55.	2.9807	544.0	.06842	.6252	.02058	42.91	27.64	.00463	1.00901	.7211
60.	2.7047	601.8	.06784	.6317	.01838	45.79	29.48	.00551	1.00817	.7121
65.	2.4783	660.2	.06716	.6364	.01665	48.80	31.26	.00645	1.00749	.7039
70.	2.2887	719.6	.06633	.6398	.01524	51.59	32.99	.00740	1.00691	.7012
75.	2.1273	780.5	.06538	.6425	.01406	54.34	34.68	.00838	1.00642	.7005
80.	1.9879	843.0	.06433	.6445	.01307	56.81	36.33	.00934	1.00600	.7045
90.	1.7590	974.3	.06193	.6474	.01147	63.28	39.50	.01159	1.00531	.6976
100.	1.5785	1113.2	.05942	.6492	.01024	69.19	42.54	.01385	1.00476	.7006
110.	1.4322	1259.9	.05691	.6504	.00925	76.86	44.86	.01658	1.00432	.6800
120.	1.3112	1412.2	.05463	.6512	.00844	83.40	47.68	.01921	1.00396	.6814
140.	1.1222	1729.4	.05079	.6521	.00719	96.50	53.08	.02489	1.00339	.6842
160.	.9812	2055.3	.04792	.6526	.00627	109.52	58.21	.03117	1.00296	.6852
180.	.8719	2384.5	.04579	.6527	.00556	122.18	63.12	.03802	1.00263	.6854
200.	.7847	2713.4	.04422	.6528	.00500	134.34	67.85	.04542	1.00237	.6853
220.	.7133	3040.8	.04304	.6528	.00454	145.94	72.42	.05332	1.00215	.6855
240.	.6539	3364.1	.04216	.6527	.00416	156.98	76.86	.06173	1.00197	.6855
260.	.6037	3683.1	.04152	.6526	.00384	167.49	81.18	.07062	1.00182	.6855
280.	.5607	3997.3	.04104	.6525	.00356	177.52	85.39	.08000	1.00169	.6854
300.	.5234	4307.0	.04070	.6525	.00333	187.13	89.51	.08985	1.00158	.6852
350.	.4488	5064.6	.04021	.6522	.00285	209.60	99.42	.11647	1.00135	.6848
400.	.3928	5806.7	.03999	.6520	.00249	230.40	108.88	.14580	1.00118	.6844
450.	.3492	6540.3	.03990	.6518	.00222	250.02	117.96	.17773	1.00105	.6842
500.	.3144	7275.0	.03981	.6517	.00200	268.84	126.72	.21203	1.00095	.6843
550.	.2859	8008.9	.03975	.6516	.00181	287.10	135.19	.24880	1.00086	.6843
600.	.2621	8747.0	.03966	.6514	.00166	304.97	143.42	.28790	1.00079	.6842
650.	.2420	9489.5	.03957	.6513	.00154	322.60	151.43	.32936	1.00073	.6840
700.	.2247	10241.4	.03944	.6513	.00143	340.07	159.24	.37302	1.00068	.6839
750.	.2098	11002.1	.03928	.6512	.00133	357.46	166.88	.41891	1.00063	.6837
800.	.1967	11774.1	.03909	.6511	.00125	374.83	174.36	.46692	1.00059	.6835
850.	.1851	12559.1	.03887	.6510	.00117	392.21	181.69	.51699	1.00056	.6834
900.	.1749	13358.4	.03862	.6510	.00111	409.64	188.90	.56905	1.00053	.6835
950.	.1657	14172.9	.03834	.6509	.00105	427.14	195.98	.62303	1.00050	.6836
1000.	.1574	15003.2	.03804	.6509	.00100	444.72	202.95	.67890	1.00047	.6838
1100.	.1431	16700.7	.03741	.6508	.00091	475.56	216.59	.78896	1.00043	.6907
1200.	.1312	18457.0	.03674	.6508	.00083	511.01	229.87	.91274	1.00040	.6911
1300.	.1211	20271.5	.03605	.6507	.00077	546.92	242.83	1.04368	1.00036	.6916
1400.	.1125	22142.8	.03536	.6506	.00071	583.30	255.50	1.18168	1.00034	.6921
1500.	.1050	24070.0	.03467	.6506	.00067	620.22	267.90	1.32672	1.00032	.6925
1600.	.0984	26040.4	.03402	.6506	.00062	657.55	280.05	1.47911	1.00030	.6926
1700.	.0926	28078.7	.03335	.6505	.00059	696.22	291.97	1.63946	1.00028	.6921
1800.	.0875	30214.8	.03265	.6505	.00056	737.47	303.67	1.80913	1.00026	.6907
2000.	.0787	35017.2	.03095	.6502	.00050	837.18	326.45	2.18740	1.00024	.6825
2200.	.0715	41273.8	.02844	.6497	.00045	988.05	344.99	2.64989	1.00022	.6554
2400.	.0654	50383.2	.02491	.6483	.00042	1243.08	366.57	3.24990	1.00020	.6206
2600.	.0601	64392.8	.02067	.6455	.00039	1678.78	388.09	4.02994	1.00018	.5766
2800.	.0554	85809.3	.01640	.6400	.00036	2388.45	410.00	4.98954	1.00017	.5343
3000.	.0509	117169.7	.01273	.6307	.00034	3466.74	432.89	6.08809	1.00015	.5027

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.70 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.034	.01292	1.2145	.9313	218.5	227.5	14.098	4.71	6.38	1283.
15.	.01305	1.1212	.9307	224.8	233.9	14.539	4.90	6.88	1254.
16.	.01319	1.0426	.9125	231.8	241.0	14.995	5.09	7.32	1224.
17.	.01335	.9761	.8968	239.2	248.5	15.453	5.27	7.77	1199.
18.	.01352	.9125	.8820	247.1	256.6	15.911	5.44	8.24	1176.
19.	.01371	.8500	.8668	255.5	265.1	16.371	5.59	8.74	1153.
20.	.01391	.7857	.8500	264.3	274.1	16.833	5.72	9.28	1129.
22.	.01437	.6554	.8104	283.7	293.8	17.774	5.93	10.48	1076.
24.	.01495	.5200	.7588	305.8	316.2	18.751	6.08	12.02	1014.
26.	.01571	.3816	.6878	331.3	342.3	19.789	6.18	14.14	934.
28.	.01682	.2364	.5913	362.1	373.9	20.959	6.31	18.03	822.
* 29.019	.01767	.1659	.5291	381.6	393.9	21.662	6.41	21.70	749.
* 29.019	.11211	.0412	.0451	638.0	716.5	32.781	7.28	25.29	378.
30.	.12448	.0537	.0395	651.7	738.8	33.540	7.04	20.53	396.
32.	.14493	.0733	.0327	673.9	775.3	34.719	6.78	16.59	424.
34.	.16265	.0894	.0285	692.7	806.6	35.667	6.61	14.79	447.
36.	.17893	.1036	.0255	709.8	835.0	36.481	6.50	13.75	468.
38.	.19432	.1166	.0232	725.8	861.8	37.206	6.43	13.08	487.
40.	.20911	.1289	.0214	741.1	887.5	37.864	6.39	12.52	504.
42.	.22344	.1406	.0199	756.0	912.4	38.471	6.37	12.28	521.
44.	.23742	.1518	.0186	770.5	936.7	39.036	6.35	12.02	536.
46.	.25114	.1626	.0175	784.7	960.5	39.566	6.33	11.81	551.
48.	.26463	.1732	.0166	798.7	984.0	40.065	6.32	11.64	565.
50.	.27793	.1835	.0157	812.6	1007.1	40.537	6.32	11.51	578.
55.	.31058	.2085	.0139	846.6	1064.0	41.622	6.32	11.27	610.
60.	.34255	.2325	.0126	880.1	1119.9	42.596	6.33	11.12	639.
65.	.37406	.2560	.0115	913.4	1175.3	43.481	6.37	11.03	666.
70.	.40522	.2789	.0105	946.7	1230.4	44.298	6.42	11.00	691.
75.	.43612	.3015	.0098	980.1	1285.4	45.057	6.50	11.01	715.
80.	.46681	.3238	.0091	1013.7	1340.5	45.768	6.59	11.04	737.
90.	.52774	.3678	.0080	1082.2	1451.6	47.078	6.82	11.19	777.
100.	.58822	.4112	.0072	1152.8	1564.6	48.267	7.09	11.41	814.
110.	.64838	.4542	.0065	1226.0	1679.9	49.363	7.38	11.66	847.
120.	.70831	.4968	.0059	1302.1	1797.9	50.390	7.67	11.93	879.
140.	.82769	.5814	.0051	1462.3	2041.7	52.269	8.23	12.45	938.
160.	.94664	.6655	.0044	1632.6	2295.3	53.960	8.71	12.90	993.
180.	1.06532	.7491	.0039	1811.4	2557.1	55.502	9.10	13.27	1045.
200.	1.18381	.8325	.0035	1997.0	2825.7	56.916	9.41	13.57	1096.
220.	1.30216	.9157	.0032	2188.1	3099.7	58.222	9.66	13.82	1144.
240.	1.42041	.9988	.0029	2383.6	3377.9	59.433	9.85	14.00	1191.
260.	1.53859	1.0817	.0027	2582.4	3659.5	60.560	10.00	14.14	1237.
280.	1.65671	1.1646	.0025	2783.8	3943.5	61.612	10.11	14.25	1281.
300.	1.77470	1.2474	.0023	2987.1	4229.4	62.598	10.19	14.33	1324.
350.	2.06970	1.4541	.0020	3500.1	4948.9	64.817	10.30	14.44	1427.
400.	2.36456	1.6607	.0018	4016.9	5672.1	66.748	10.35	14.48	1524.
450.	2.65935	1.8672	.0016	4535.5	6397.0	68.455	10.37	14.50	1616.
500.	2.95408	2.0737	.0014	5054.7	7122.6	69.983	10.39	14.52	1702.
550.	3.24878	2.2800	.0013	5574.5	7848.7	71.368	10.40	14.53	1784.
600.	3.54346	2.4863	.0012	6095.5	8575.9	72.630	10.42	14.55	1863.
650.	3.83811	2.6927	.0011	6617.2	9303.8	73.792	10.45	14.57	1938.
700.	4.13275	2.8989	.0010	7140.5	10033.4	74.880	10.48	14.60	2010.
750.	4.42738	3.1052	.0009	7665.8	10764.9	75.891	10.52	14.64	2079.
800.	4.72201	3.3115	.0009	8193.1	11498.5	76.838	10.57	14.69	2146.
850.	5.01662	3.5177	.0008	8723.3	12234.9	77.731	10.63	14.75	2210.
900.	5.31123	3.7240	.0008	9256.5	12974.4	78.575	10.70	14.82	2272.
950.	5.60584	3.9302	.0007	9793.2	13717.3	79.377	10.77	14.90	2331.
1000.	5.90045	4.1365	.0007	10333.7	14464.0	80.142	10.86	14.98	2389.
1100.	6.48965	4.5489	.0006	11429.1	15971.9	81.569	11.04	15.16	2500.
1200.	7.07884	4.9614	.0006	12544.0	17499.2	82.890	11.24	15.36	2604.
1300.	7.66803	5.3738	.0005	13679.6	19047.2	84.128	11.45	15.58	2703.
1400.	8.25722	5.7863	.0005	14836.7	20616.8	85.299	11.68	15.80	2798.
1500.	8.84643	6.1987	.0005	16015.9	22208.4	86.411	11.91	16.03	2889.
1600.	9.43567	6.6111	.0004	17216.7	23821.7	87.445	12.13	16.26	2976.
1700.	10.02503	7.0236	.0004	18441.0	25458.5	88.433	12.37	16.50	3060.
1800.	10.61465	7.4360	.0004	19690.8	27121.1	89.382	12.64	16.77	3141.
2000.	11.79592	8.2608	.0004	22284.7	30541.8	91.194	13.32	17.48	3292.
2200.	12.98451	9.0857	.0003	25056.2	34145.3	92.903	14.48	18.72	3427.
2400.	14.19176	9.9105	.0003	28149.2	38083.5	94.610	16.50	20.92	3544.
2600.	15.43917	10.7354	.0003	31801.9	42609.3	96.419	19.89	24.69	3648.
2800.	16.76242	11.5602	.0003	36366.6	48100.3	98.456	25.15	30.65	3751.
3000.	18.21479	12.3851	.0002	42312.9	55063.2	100.864	32.73	39.46	3860.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.70 MPA ISOBAR

	TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
*	14.034	77.4091	644.0	.25560	94.0105	.00991	75.42	259.12	.00055	1.25296	2.1920
	15.	76.6375	634.7	.24774	85.9246	.01083	83.85	228.80	.00057	1.25024	1.8761
	16.	75.7962	633.6	.23643	79.0247	.01155	89.99	203.88	.00058	1.24729	1.6576
	17.	74.8918	633.3	.22711	73.0991	.01227	94.05	183.49	.00058	1.24412	1.5159
	18.	73.9440	630.7	.21933	67.4756	.01307	96.95	166.73	.00057	1.24080	1.4179
	19.	72.9482	625.4	.21269	62.0050	.01398	98.66	152.68	.00056	1.23732	1.3529
	20.	71.8967	616.4	.20678	56.4899	.01505	100.21	140.66	.00054	1.23365	1.3020
	22.	69.5856	589.9	.19642	45.6088	.01777	103.00	120.92	.00051	1.22561	1.2306
	24.	66.8966	550.9	.18662	34.7861	.02181	102.97	104.85	.00046	1.21630	1.2235
	26.	63.6599	499.3	.17471	24.2906	.02832	100.38	90.86	.00040	1.20516	1.2796
	28.	59.4604	428.5	.15755	14.0551	.04207	94.89	77.51	.00032	1.19081	1.4724
*	29.019	56.5997	385.0	.14582	9.3871	.05636	90.49	70.31	.00027	1.18110	1.6861
*	29.019	8.9195	206.1	.06948	.3678	.12267	33.26	17.94	.00053	1.02714	1.3637
	30.	8.0336	224.4	.06982	.4315	.09151	31.56	18.14	.00069	1.02442	1.1801
	32.	6.8999	256.5	.06995	.5059	.06468	31.07	18.78	.00098	1.02095	1.0029
	34.	6.1483	285.1	.07009	.5496	.05186	31.52	19.53	.00125	1.01865	.9160
	36.	5.5888	311.9	.07026	.5789	.04409	32.32	20.31	.00151	1.01694	.8640
	38.	5.1461	337.8	.07021	.6002	.03873	33.30	21.10	.00178	1.01559	.8294
	40.	4.7823	363.2	.07007	.6164	.03476	34.37	21.90	.00205	1.01448	.8044
	42.	4.4755	388.0	.06990	.6291	.03165	35.49	22.70	.00232	1.01355	.7854
	44.	4.2119	412.4	.06971	.6393	.02914	36.65	23.49	.00261	1.01275	.7704
	46.	3.9819	436.4	.06952	.6476	.02706	37.83	24.28	.00290	1.01205	.7581
	48.	3.7789	460.2	.06933	.6545	.02530	39.01	25.06	.00319	1.01143	.7479
	50.	3.5980	483.8	.06913	.6603	.02379	40.20	25.82	.00349	1.01088	.7394
	55.	3.2198	542.2	.06860	.6713	.02078	43.12	27.71	.00428	1.00973	.7240
	60.	2.9193	600.3	.06800	.6788	.01852	45.98	29.54	.00510	1.00882	.7142
	65.	2.6734	658.9	.06730	.6843	.01674	48.97	31.32	.00598	1.00808	.7055
	70.	2.4678	718.5	.06647	.6883	.01531	51.75	33.05	.00686	1.00746	.7025
	75.	2.2929	779.6	.06551	.6914	.01412	54.48	34.73	.00777	1.00693	.7016
	80.	2.1422	842.2	.06444	.6937	.01311	56.94	36.37	.00866	1.00647	.7054
	90.	1.8949	973.7	.06202	.6970	.01150	63.40	39.54	.01076	1.00572	.6982
	100.	1.7000	1112.8	.05950	.6991	.01025	69.30	42.58	.01286	1.00513	.7010
	110.	1.5423	1259.7	.05698	.7005	.00926	76.92	44.87	.01539	1.00465	.6804
	120.	1.4118	1412.1	.05469	.7014	.00845	83.45	47.69	.01784	1.00426	.6818
	140.	1.2082	1729.5	.05084	.7025	.00720	96.54	53.09	.02311	1.00364	.6844
	160.	1.0564	2055.6	.04796	.7030	.00627	109.55	58.21	.02894	1.00319	.6854
	180.	.9387	2385.0	.04583	.7032	.00556	122.21	63.12	.03531	1.00283	.6856
	200.	.8447	2714.1	.04425	.7032	.00500	134.36	67.85	.04219	1.00255	.6855
	220.	.7680	3041.6	.04306	.7032	.00454	145.96	72.43	.04953	1.00232	.6856
	240.	.7040	3365.0	.04218	.7031	.00416	157.00	76.87	.05733	1.00212	.6856
	260.	.6499	3684.0	.04154	.7030	.00384	167.50	81.19	.06560	1.00196	.6855
	280.	.6036	3998.3	.04106	.7029	.00356	177.53	85.40	.07430	1.00182	.6855
	300.	.5635	4308.1	.04071	.7029	.00333	187.14	89.51	.08345	1.00170	.6853
	350.	.4832	5065.8	.04022	.7026	.00285	209.61	99.43	.10818	1.00146	.6848
	400.	.4229	5808.0	.04000	.7023	.00249	230.40	108.89	.13542	1.00127	.6845
	450.	.3760	6541.7	.03991	.7021	.00222	250.03	117.97	.16507	1.00113	.6842
	500.	.3385	7276.4	.03982	.7020	.00200	268.85	126.72	.19693	1.00102	.6843
	550.	.3078	8010.4	.03975	.7018	.00181	287.10	135.19	.23107	1.00093	.6843
	600.	.2822	8748.5	.03967	.7017	.00166	304.98	143.42	.26738	1.00085	.6842
	650.	.2605	9491.0	.03958	.7016	.00154	322.60	151.43	.30589	1.00079	.6840
	700.	.2420	10242.9	.03944	.7015	.00143	340.08	159.24	.34643	1.00073	.6839
	750.	.2259	11003.6	.03929	.7014	.00133	357.47	166.88	.38904	1.00068	.6837
	800.	.2118	11775.6	.03910	.7013	.00125	374.83	174.36	.43363	1.00064	.6835
	850.	.1993	12560.7	.03888	.7012	.00117	392.22	181.69	.48012	1.00060	.6834
	900.	.1883	13360.0	.03862	.7012	.00111	409.64	188.90	.52847	1.00057	.6835
	950.	.1784	14174.5	.03834	.7011	.00105	427.14	195.98	.57860	1.00054	.6836
	1000.	.1695	15004.8	.03804	.7010	.00100	444.73	202.95	.63047	1.00051	.6838
	1100.	.1541	16702.3	.03741	.7010	.00091	475.56	216.60	.73268	1.00046	.6907
	1200.	.1413	18458.6	.03674	.7009	.00083	511.01	229.87	.84762	1.00043	.6911
	1300.	.1304	20273.2	.03605	.7008	.00077	546.92	242.83	.96921	1.00039	.6916
	1400.	.1211	22144.4	.03536	.7008	.00071	583.30	255.50	1.09735	1.00036	.6921
	1500.	.1130	24071.2	.03467	.7007	.00067	620.20	267.90	1.23203	1.00034	.6925
	1600.	.1060	26040.7	.03402	.7007	.00062	657.49	280.05	1.37350	1.00032	.6926
	1700.	.0998	28076.7	.03336	.7006	.00059	696.07	291.97	1.52233	1.00030	.6922
	1800.	.0942	30208.0	.03267	.7005	.00056	737.13	303.67	1.67972	1.00028	.6908
	2000.	.0848	34983.6	.03099	.7003	.00050	835.81	326.45	2.03000	1.00026	.6829
	2200.	.0770	41163.7	.02853	.6997	.00045	983.76	344.98	2.45673	1.00023	.6564
	2400.	.0705	50095.6	.02508	.6983	.00042	1232.07	366.56	3.00849	1.00021	.6225
	2600.	.0648	63753.9	.02090	.6953	.00039	1654.55	388.05	3.72534	1.00020	.5790
	2800.	.0597	84562.7	.01666	.6897	.00036	2341.43	409.90	4.60924	1.00018	.5366
	3000.	.0549	114990.9	.01299	.6799	.00034	3384.84	432.70	5.62467	1.00017	.5044

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.75 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.051	.01291	1.2178	.9319	218.5	228.2	14.099	4.71	6.38	1284.
15.	.01304	1.1277	.9313	224.7	234.5	14.532	4.90	6.86	1257.
16.	.01319	1.0478	.9140	231.6	241.5	14.987	5.09	7.31	1226.
17.	.01334	.9810	.8983	239.1	249.1	15.445	5.27	7.76	1202.
18.	.01351	.9174	.8835	246.9	257.1	15.903	5.44	8.23	1179.
19.	.01370	.8550	.8683	255.3	265.6	16.361	5.58	8.73	1156.
20.	.01390	.7907	.8516	264.1	274.6	16.823	5.72	9.26	1132.
22.	.01436	.6608	.8122	283.5	294.2	17.761	5.93	10.45	1079.
24.	.01493	.5258	.7609	305.4	316.6	18.734	6.08	11.97	1017.
26.	.01568	.3884	.6909	330.7	342.5	19.767	6.18	14.04	939.
28.	.01676	.2468	.5963	361.2	373.7	20.923	6.31	17.64	831.
* 29.433	.01801	.1445	.5072	389.2	402.7	21.930	6.45	23.44	725.
* 29.43	.10318	.0381	.0497	635.1	712.5	32.462	7.36	27.64	378.
[illegible]	.11069	.0463	.0454	644.2	727.2	32.958	7.19	23.52	389.
32.	.13146	.0681	.0366	668.7	767.3	34.254	6.86	17.71	419.
34.	.14879	.0852	.0315	688.6	800.2	35.252	6.66	15.41	444.
36.	.16448	.1001	.0280	706.3	829.7	36.095	6.53	14.16	466.
38.	.17920	.1136	.0254	722.8	857.2	36.838	6.46	13.38	485.
40.	.19327	.1262	.0233	738.5	883.4	37.510	6.41	12.85	503.
42.	.20686	.1382	.0216	753.6	908.7	38.127	6.38	12.46	520.
44.	.22009	.1497	.0202	768.3	933.3	38.700	6.36	12.17	535.
46.	.23304	.1607	.0190	782.7	957.4	39.236	6.34	11.94	550.
48.	.24576	.1715	.0179	796.8	981.1	39.740	6.33	11.76	564.
50.	.25829	.1819	.0170	810.8	1004.5	40.217	6.32	11.61	578.
55.	.28898	.2072	.0150	845.0	1061.8	41.309	6.32	11.34	610.
60.	.31900	.2315	.0135	878.8	1118.0	42.289	6.34	11.17	639.
65.	.34855	.2552	.0123	912.2	1173.6	43.178	6.37	11.08	666.
70.	.37775	.2783	.0113	945.6	1228.9	43.998	6.43	11.04	691.
75.	.40668	.3010	.0105	979.1	1284.1	44.759	6.50	11.04	715.
80.	.43541	.3235	.0098	1012.8	1339.3	45.472	6.59	11.07	737.
90.	.49241	.3676	.0086	1081.4	1450.7	46.784	6.82	11.21	777.
100.	.54896	.4112	.0077	1152.1	1563.8	47.976	7.09	11.42	814.
110.	.60518	.4543	.0070	1225.4	1679.3	49.073	7.38	11.68	848.
120.	.66118	.4970	.0064	1301.5	1797.4	50.101	7.68	11.94	879.
140.	.77270	.5817	.0054	1461.9	2041.4	51.981	8.23	12.45	938.
160.	.88380	.6659	.0047	1632.2	2295.1	53.673	8.71	12.90	993.
180.	.99462	.7496	.0042	1811.0	2557.0	55.215	9.10	13.28	1046.
200.	1.10525	.8330	.0038	1996.7	2825.7	56.630	9.41	13.58	1096.
220.	1.21575	.9163	.0034	2187.9	3099.7	57.936	9.66	13.82	1145.
240.	1.32614	.9994	.0031	2383.4	3378.0	59.147	9.85	14.00	1192.
260.	1.43646	1.0824	.0029	2582.2	3659.6	60.275	10.00	14.15	1237.
280.	1.54673	1.1653	.0027	2783.6	3943.6	61.327	10.11	14.25	1282.
300.	1.65687	1.2481	.0025	2987.0	4229.6	62.313	10.19	14.33	1325.
350.	1.93223	1.4549	.0021	3500.0	4949.2	64.532	10.30	14.44	1428.
400.	2.20745	1.6615	.0019	4016.8	5672.4	66.463	10.35	14.48	1525.
450.	2.48260	1.8680	.0017	4535.4	6397.3	68.170	10.37	14.50	1616.
500.	2.75770	2.0745	.0015	5054.6	7122.9	69.699	10.39	14.52	1703.
550.	3.03275	2.2809	.0014	5574.5	7849.1	71.083	10.40	14.53	1785.
600.	3.30779	2.4872	.0013	6095.4	8576.2	72.346	10.42	14.55	1863.
650.	3.58280	2.6935	.0012	6617.1	9304.2	73.508	10.45	14.57	1938.
700.	3.85781	2.8998	.0011	7140.4	10033.8	74.596	10.48	14.61	2010.
750.	4.13280	3.1061	.0010	7665.7	10765.3	75.606	10.52	14.65	2079.
800.	4.40778	3.3123	.0009	8193.1	11498.9	76.554	10.57	14.69	2146.
850.	4.68276	3.5186	.0009	8723.3	12235.3	77.446	10.63	14.75	2210.
900.	4.95773	3.7249	.0008	9256.5	12974.8	78.290	10.70	14.82	2272.
950.	5.23270	3.9311	.0008	9793.2	13717.7	79.092	10.77	14.90	2332.
1000.	5.50767	4.1373	.0008	10333.7	14464.4	79.858	10.86	14.98	2389.
1100.	6.05759	4.5498	.0007	11429.1	15972.3	81.284	11.04	15.16	2500.
1200.	6.60751	4.9623	.0006	12544.0	17499.6	82.605	11.24	15.36	2604.
1300.	7.15742	5.3747	.0006	13679.6	19047.6	83.844	11.45	15.58	2704.
1400.	7.70733	5.7872	.0005	14836.7	20617.2	85.014	11.68	15.80	2798.
1500.	8.25725	6.1996	.0005	16015.9	22208.8	86.126	11.91	16.03	2889.
1600.	8.80722	6.6120	.0005	17216.6	23822.0	87.180	12.13	16.26	2977.
1700.	9.35728	7.0245	.0004	18440.8	25458.7	88.148	12.37	16.50	3061.
1800.	9.90758	7.4369	.0004	19690.3	27121.0	89.097	12.63	16.77	3142.
2000.	11.01001	8.2617	.0004	22282.4	30539.9	90.908	13.31	17.47	3293.
2200.	12.11903	9.0866	.0003	25048.3	34137.6	92.614	14.44	18.67	3427.
2400.	13.24489	9.9114	.0003	28127.0	38060.7	94.315	16.40	20.81	3545.
2600.	14.40696	10.7363	.0003	31748.4	42553.6	96.111	19.68	24.46	3651.
2800.	15.63741	11.5611	.0003	36252.8	47980.8	98.125	24.78	30.23	3753.
3000.	16.98432	12.3860	.0003	42093.6	54831.8	100.494	32.11	38.75	3862.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.75 MPA ISOBAR

TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 14.051	77.4371	645.6	.25554	94.3031	.00988	75.62	259.43	.00055	1.25306	2.1889
15.	76.6812	637.2	.24782	86.4746	.01077	83.90	229.58	.00057	1.25040	1.8779
16.	75.8429	635.4	.23674	79.4675	.01150	90.06	204.56	.00058	1.24745	1.6600
17.	74.9421	635.2	.22741	73.5219	.01222	94.14	184.10	.00058	1.24429	1.5176
18.	73.9982	632.6	.21963	67.8869	.01301	97.06	167.28	.00057	1.24099	1.4190
19.	73.0065	627.5	.21297	62.4230	.01391	98.79	153.19	.00056	1.23752	1.3534
20.	71.9596	618.6	.20706	56.9019	.01497	100.35	141.14	.00054	1.23387	1.3020
22.	69.6612	592.5	.19669	46.0331	.01764	103.18	121.36	.00051	1.22587	1.2294
24.	66.9921	553.9	.18691	35.2244	.02160	103.21	105.28	.00046	1.21663	1.2206
26.	63.7896	503.3	.17518	24.7737	.02789	100.69	91.31	.00040	1.20561	1.2728
28.	59.6744	435.6	.15846	14.7274	.04049	95.38	78.09	.00033	1.19154	1.4441
* 29.433	55.5286	370.9	.14163	8.0260	.06319	88.93	67.91	.00025	1.17747	1.7896
* 29.433	9.6920	205.6	.06958	.3694	.13443	34.97	18.42	.00047	1.02951	1.4557
30.	9.0339	217.0	.06983	.4184	.10840	33.34	18.47	.00056	1.02749	1.3031
32.	7.6071	251.0	.07009	.5181	.07057	31.95	19.00	.00085	1.02311	1.0532
34.	6.7210	280.5	.07030	.5729	.05494	32.13	19.69	.00112	1.02040	.9445
36.	6.0798	307.7	.07053	.6086	.04601	32.80	20.45	.00137	1.01844	.8827
38.	5.5804	334.1	.07049	.6340	.04005	33.70	21.23	.00162	1.01692	.8428
40.	5.1742	359.8	.07035	.6532	.03572	34.73	22.01	.00188	1.01568	.8146
42.	4.8342	384.9	.07016	.6681	.03238	35.81	22.80	.00214	1.01464	.7936
44.	4.5436	409.6	.06996	.6800	.02971	36.94	23.59	.00241	1.01376	.7770
46.	4.2911	433.9	.06975	.6897	.02752	38.10	24.36	.00268	1.01299	.7636
48.	4.0690	457.9	.06955	.6977	.02568	39.27	25.14	.00296	1.01231	.7526
50.	3.8716	481.6	.06934	.7044	.02410	40.44	25.90	.00324	1.01171	.7434
55.	3.4604	540.4	.06878	.7171	.02098	43.33	27.78	.00398	1.01047	.7269
60.	3.1348	598.8	.06816	.7258	.01866	46.16	29.60	.00474	1.00948	.7164
65.	2.8690	657.7	.06745	.7321	.01684	49.14	31.37	.00557	1.00867	.7072
70.	2.6473	717.5	.06660	.7367	.01538	51.91	33.10	.00640	1.00800	.7038
75.	2.4589	778.7	.06563	.7402	.01417	54.62	34.78	.00725	1.00743	.7027
80.	2.2967	841.5	.06455	.7429	.01315	57.07	36.42	.00808	1.00694	.7063
90.	2.0308	973.1	.06212	.7466	.01152	63.52	39.58	.01004	1.00613	.6988
100.	1.8216	1112.4	.05958	.7490	.01027	69.41	42.61	.01201	1.00550	.7014
110.	1.6524	1259.5	.05705	.7506	.00927	76.97	44.89	.01436	1.00499	.6809
120.	1.5124	1412.0	.05475	.7517	.00846	83.50	47.71	.01665	1.00456	.6821
140.	1.2942	1729.7	.05088	.7529	.00720	96.58	53.10	.02157	1.00390	.6847
160.	1.1315	2056.0	.04800	.7534	.00628	109.58	58.22	.02702	1.00341	.6856
180.	1.0054	2385.6	.04586	.7537	.00557	122.23	63.13	.03296	1.00303	.6857
200.	.9048	2714.7	.04428	.7537	.00500	134.38	67.86	.03938	1.00273	.6856
220.	.8225	3042.4	.04308	.7537	.00454	145.98	72.43	.04624	1.00248	.6856
240.	.7541	3365.9	.04221	.7536	.00416	157.01	76.87	.05353	1.00227	.6856
260.	.6962	3685.0	.04156	.7535	.00384	167.52	81.19	.06124	1.00210	.6856
280.	.6465	3999.4	.04108	.7534	.00356	177.55	85.40	.06937	1.00195	.6855
300.	.6035	4309.3	.04073	.7533	.00332	187.15	89.52	.07791	1.00182	.6853
350.	.5175	5067.1	.04023	.7530	.00285	209.62	99.43	.10099	1.00156	.6848
400.	.4530	5809.3	.04002	.7527	.00249	230.41	108.89	.12642	1.00137	.6845
450.	.4028	6543.1	.03992	.7525	.00222	250.04	117.97	.15410	1.00121	.6842
500.	.3626	7277.8	.03983	.7523	.00199	268.85	126.72	.18383	1.00109	.6843
550.	.3297	8011.8	.03976	.7521	.00181	287.11	135.19	.21570	1.00099	.6843
600.	.3023	8749.9	.03968	.7519	.00166	304.98	143.42	.24960	1.00091	.6842
650.	.2791	9492.5	.03958	.7518	.00154	322.61	151.43	.28554	1.00084	.6840
700.	.2592	10244.4	.03945	.7517	.00143	340.08	159.24	.32338	1.00078	.6839
750.	.2420	11005.1	.03929	.7516	.00133	357.47	166.88	.36316	1.00073	.6837
800.	.2269	11777.1	.03910	.7515	.00125	374.84	174.36	.40477	1.00068	.6835
850.	.2135	12562.2	.03888	.7514	.00117	392.22	181.69	.44817	1.00064	.6834
900.	.2017	13361.5	.03863	.7513	.00111	409.65	188.90	.49329	1.00061	.6835
950.	.1911	14176.1	.03835	.7513	.00105	427.14	195.98	.54009	1.00058	.6836
1000.	.1816	15006.4	.03804	.7512	.00100	444.73	202.95	.58851	1.00055	.6838
1100.	.1651	16703.9	.03741	.7511	.00091	475.56	216.60	.68389	1.00050	.6907
1200.	.1513	18460.3	.03675	.7510	.00083	511.01	229.88	.79118	1.00046	.6911
1300.	.1397	20274.8	.03606	.7509	.00077	546.92	242.83	.90467	1.00042	.6916
1400.	.1297	22145.9	.03536	.7509	.00071	583.29	255.50	1.02427	1.00039	.6921
1500.	.1211	24072.5	.03468	.7508	.00067	620.18	267.90	1.14996	1.00036	.6925
1600.	.1135	26041.1	.03402	.7508	.00062	657.44	280.05	1.28199	1.00034	.6926
1700.	.1069	28075.1	.03337	.7507	.00059	695.94	291.97	1.42063	1.00032	.6922
1800.	.1009	30202.0	.03268	.7506	.00056	736.83	303.67	1.56759	1.00030	.6909
2000.	.0908	34953.6	.03102	.7504	.00050	834.58	326.45	1.89370	1.00027	.6833
2200.	.0825	41065.1	.02861	.7498	.00045	979.91	344.98	2.28969	1.00025	.6573
2400.	.0755	49837.3	.02523	.7483	.00042	1222.18	366.54	2.80007	1.00023	.6242
2600.	.0694	63180.0	.02112	.7452	.00039	1632.77	388.01	3.46268	1.00021	.5812
2800.	.0639	83441.9	.01691	.7393	.00036	2299.14	409.81	4.28134	1.00019	.5389
3000.	.0589	113029.4	.01322	.7293	.00034	3311.10	432.53	5.22482	1.00018	.5062

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.80 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.067	.01291	1.2211	.9325	218.5	228.8	14.100	4.71	6.38	1286.
15.	.01303	1.1342	.9319	224.6	235.0	14.525	4.90	6.85	1259.
16.	.01318	1.0530	.9155	231.5	242.1	14.980	5.09	7.30	1229.
17.	.01333	.9860	.8998	238.9	249.6	15.437	5.27	7.75	1204.
18.	.01350	.9223	.8850	246.8	257.6	15.894	5.43	8.22	1181.
19.	.01369	.8601	.8698	255.1	266.1	16.352	5.58	8.71	1159.
20.	.01388	.7958	.8531	263.9	275.1	16.812	5.71	9.24	1134.
22.	.01434	.6662	.8139	283.2	294.7	17.749	5.93	10.42	1082.
24.	.01491	.5315	.7631	305.0	317.0	18.718	6.08	11.92	1021.
26.	.01565	.3950	.6939	330.2	342.7	19.746	6.18	13.94	944.
28.	.01670	.2545	.6010	360.3	373.7	20.890	6.30	17.39	838.
* 29.828	.01837	.1248	.4856	396.8	411.5	22.196	6.49	25.51	700.
* 29.828	.09519	.0349	.0545	631.9	708.1	32.145	7.46	30.49	378.
30.	.09783	.0379	.0526	635.3	713.6	32.330	7.38	28.36	382.
32.	.11945	.0627	.0408	663.2	758.7	33.790	6.95	19.10	415.
34.	.13656	.0810	.0347	684.4	793.6	34.849	6.71	16.11	441.
36.	.15178	.0966	.0306	702.8	824.2	35.723	6.56	14.60	464.
38.	.16594	.1106	.0276	719.7	852.5	36.487	6.48	13.70	484.
40.	.17939	.1236	.0253	735.7	879.2	37.173	6.42	13.09	502.
42.	.19234	.1358	.0234	751.1	905.0	37.801	6.39	12.66	519.
44.	.20491	.1475	.0218	766.0	929.9	38.381	6.37	12.33	534.
46.	.21720	.1588	.0205	780.6	954.3	38.923	6.35	12.07	549.
48.	.22925	.1697	.0193	794.9	978.3	39.433	6.34	11.87	564.
50.	.24110	.1804	.0183	808.9	1001.8	39.914	6.33	11.71	577.
55.	.27010	.2060	.0162	843.5	1059.5	41.015	6.33	11.41	609.
60.	.29840	.2305	.0145	877.4	1116.1	42.000	6.34	11.23	639.
65.	.32623	.2544	.0132	911.0	1172.0	42.893	6.38	11.12	666.
70.	.35372	.2777	.0121	944.5	1227.5	43.716	6.43	11.07	691.
75.	.38093	.3005	.0112	978.0	1282.8	44.479	6.50	11.07	715.
80.	.40794	.3231	.0105	1011.9	1338.2	45.195	6.59	11.10	737.
90.	.46149	.3675	.0092	1080.6	1449.8	46.510	6.82	11.23	778.
100.	.51461	.4112	.0082	1151.4	1563.1	47.762	7.09	11.44	815.
110.	.56739	.4543	.0074	1224.8	1678.7	48.801	7.38	11.69	848.
120.	.61995	.4972	.0068	1300.9	1796.9	49.830	7.68	11.95	880.
140.	.72459	.5821	.0058	1461.4	2041.1	51.711	8.23	12.46	939.
160.	.82881	.6663	.0050	1631.9	2294.9	53.404	8.71	12.91	994.
180.	.93276	.7501	.0045	1810.7	2556.9	54.947	9.10	13.28	1046.
200.	1.03651	.8336	.0040	1996.4	2825.6	56.363	9.41	13.58	1097.
220.	1.14013	.9169	.0037	2187.6	3099.7	57.669	9.66	13.82	1145.
240.	1.24366	1.0000	.0033	2383.2	3378.1	58.880	9.85	14.01	1192.
260.	1.34710	1.0831	.0031	2582.0	3659.7	60.008	10.00	14.15	1238.
280.	1.45049	1.1660	.0029	2783.4	3943.8	61.060	10.11	14.25	1282.
300.	1.55377	1.2488	.0027	2986.8	4229.8	62.046	10.19	14.33	1325.
350.	1.81194	1.4557	.0023	3499.9	4949.5	64.265	10.30	14.44	1428.
400.	2.06998	1.6623	.0020	4016.7	5672.7	66.197	10.35	14.48	1525.
450.	2.32794	1.8689	.0018	4535.3	6397.7	67.904	10.37	14.50	1616.
500.	2.58586	2.0753	.0016	5054.6	7123.2	69.432	10.39	14.52	1703.
550.	2.84373	2.2817	.0015	5574.4	7849.4	70.817	10.40	14.53	1785.
600.	3.10158	2.4880	.0013	6095.4	8576.6	72.079	10.42	14.55	1864.
650.	3.35941	2.6944	.0012	6617.1	9304.6	73.241	10.45	14.57	1939.
700.	3.61723	2.9007	.0011	7140.4	10034.2	74.330	10.48	14.61	2011.
750.	3.87504	3.1069	.0011	7665.7	10765.7	75.340	10.52	14.65	2080.
800.	4.13284	3.3132	.0010	8193.1	11499.3	76.288	10.57	14.69	2146.
850.	4.39063	3.5195	.0009	8723.2	12235.8	77.180	10.63	14.75	2210.
900.	4.64842	3.7257	.0009	9256.5	12975.2	78.024	10.70	14.82	2272.
950.	4.90621	3.9320	.0008	9793.2	13718.1	78.826	10.77	14.90	2332.
1000.	5.16399	4.1382	.0008	10333.6	14464.8	79.591	10.86	14.98	2390.
1100.	5.67954	4.5507	.0007	11429.1	15972.7	81.018	11.04	15.16	2500.
1200.	6.19509	4.9631	.0007	12544.0	17500.0	82.339	11.24	15.36	2605.
1300.	6.71063	5.3756	.0006	13679.5	19048.1	83.577	11.45	15.58	2704.
1400.	7.22618	5.7880	.0006	14836.7	20617.6	84.748	11.68	15.80	2799.
1500.	7.74173	6.2005	.0005	16015.9	22209.3	85.860	11.91	16.03	2889.
1600.	8.25732	6.6129	.0005	17216.5	23822.4	86.894	12.13	16.26	2977.
1700.	8.77300	7.0253	.0005	18440.6	25459.0	87.882	12.37	16.50	3061.
1800.	9.28889	7.4378	.0004	19689.8	27121.0	88.831	12.63	16.76	3142.
2000.	10.32234	8.2626	.0004	22280.3	30538.2	90.641	13.30	17.45	3293.
2200.	11.36178	9.0875	.0004	25041.2	34130.6	92.345	14.40	18.63	3428.
2400.	12.41649	9.9123	.0003	28107.0	38040.2	94.039	16.31	20.71	3547.
2600.	13.50409	10.7372	.0003	31700.0	42503.3	95.823	19.50	24.25	3653.
2800.	14.65376	11.5620	.0003	36149.8	47872.8	97.816	24.44	29.85	3755.
3000.	15.90915	12.3869	.0003	41895.2	54622.5	100.150	31.55	38.10	3863.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.80 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 14.067	77.4651	647.3	.25548	94.5954	.00986	75.82	259.74	.00055	1.25315	2.1858
15.	76.7248	639.7	.24789	87.0229	.01071	83.96	230.36	.00058	1.25055	1.8798
16.	75.8894	637.2	.23706	79.9090	.01146	90.13	205.24	.00059	1.24761	1.6623
17.	74.9923	637.0	.22772	73.9430	.01217	94.23	184.71	.00058	1.24447	1.5193
18.	74.0521	634.5	.21992	68.2963	.01296	97.16	167.84	.00057	1.24118	1.4202
19.	73.0644	629.5	.21325	62.8392	.01384	98.91	153.70	.00056	1.23772	1.3539
20.	72.0222	620.7	.20734	57.3120	.01489	100.49	141.61	.00054	1.23409	1.3021
22.	69.7362	595.0	.19695	46.4549	.01752	103.36	121.79	.00051	1.22613	1.2283
24.	67.0865	556.9	.18721	35.6589	.02140	103.44	105.70	.00047	1.21696	1.2178
26.	63.9171	507.2	.17564	25.2504	.02748	101.00	91.76	.00041	1.20615	1.2664
28.	59.8722	440.8	.15929	15.2350	.03945	95.83	78.64	.00033	1.19221	1.4271
* 29.828	54.4335	356.9	.13744	6.7925	.07148	87.32	65.59	.00023	1.17378	1.9163
* 29.828	10.5055	205.0	.06963	.3666	.14877	36.90	18.93	.00041	1.03202	1.5640
30.	10.2218	208.9	.06974	.3877	.13577	36.00	18.91	.00045	1.03114	1.4894
32.	8.3720	245.4	.07019	.5246	.07784	32.98	19.24	.00074	1.02545	1.1143
34.	7.3227	275.8	.07050	.5930	.05844	32.80	19.88	.00100	1.02224	.9767
36.	6.5883	303.6	.07080	.6361	.04810	33.31	20.60	.00125	1.01999	.9031
38.	6.0264	330.4	.07078	.6664	.04146	34.13	21.36	.00149	1.01828	.8572
40.	5.5746	356.5	.07063	.6889	.03672	35.10	22.13	.00173	1.01690	.8254
42.	5.1992	381.9	.07044	.7062	.03314	36.14	22.91	.00198	1.01575	.8020
44.	4.8801	406.9	.07022	.7200	.03030	37.24	23.68	.00223	1.01478	.7839
46.	4.6041	431.4	.06999	.7312	.02799	38.38	24.45	.00249	1.01394	.7693
48.	4.3621	455.6	.06978	.7405	.02605	39.52	25.22	.00275	1.01320	.7574
50.	4.1476	479.5	.06955	.7482	.02441	40.68	25.98	.00302	1.01255	.7476
55.	3.7024	538.7	.06896	.7626	.02118	43.54	27.85	.00371	1.01120	.7299
60.	3.3512	597.4	.06833	.7726	.01880	46.35	29.66	.00443	1.01013	.7186
65.	3.0653	656.5	.06760	.7797	.01694	49.32	31.43	.00521	1.00927	.7088
70.	2.8271	716.5	.06673	.7850	.01546	52.06	33.15	.00599	1.00854	.7051
75.	2.6251	777.8	.06575	.7889	.01423	54.76	34.82	.00678	1.00793	.7039
80.	2.4513	840.7	.06467	.7920	.01320	57.20	36.46	.00757	1.00741	.7073
90.	2.1669	972.6	.06222	.7962	.01155	63.64	39.62	.00941	1.00654	.6994
100.	1.9432	1112.0	.05967	.7990	.01029	69.53	42.65	.01126	1.00587	.7017
110.	1.7625	1259.3	.05712	.8007	.00928	77.03	44.90	.01346	1.00532	.6813
120.	1.6130	1412.0	.05481	.8019	.00846	83.55	47.72	.01560	1.00487	.6825
140.	1.3801	1729.9	.05093	.8033	.00720	96.62	53.11	.02023	1.00416	.6849
160.	1.2065	2056.3	.04804	.8039	.00628	109.61	58.23	.02533	1.00364	.6858
180.	1.0721	2386.1	.04589	.8042	.00557	122.26	63.14	.03091	1.00323	.6859
200.	.9648	2715.4	.04430	.8042	.00500	134.41	67.86	.03693	1.00291	.6857
220.	.8771	3043.2	.04311	.8042	.00454	146.00	72.44	.04336	1.00265	.6857
240.	.8041	3366.8	.04223	.8041	.00416	157.03	76.87	.05019	1.00242	.6857
260.	.7423	3685.0	.04157	.8040	.00384	167.53	81.19	.05743	1.00224	.6857
280.	.6894	4000.4	.04110	.8039	.00356	177.56	85.40	.06505	1.00208	.6856
300.	.6436	4310.4	.04075	.8037	.00332	187.16	89.52	.07306	1.00194	.6854
350.	.5519	5068.3	.04025	.8034	.00285	209.63	99.43	.09470	1.00166	.6849
400.	.4831	5810.6	.04003	.8031	.00249	230.42	108.89	.11855	1.00146	.6845
450.	.4296	6544.4	.03993	.8028	.00222	250.05	117.97	.14450	1.00129	.6842
500.	.3867	7279.3	.03984	.8026	.00199	268.86	126.72	.17238	1.00117	.6844
550.	.3517	8013.2	.03977	.8024	.00181	287.11	135.20	.20226	1.00106	.6843
600.	.3224	8751.4	.03969	.8022	.00166	304.99	143.42	.23404	1.00097	.6842
650.	.2977	9493.9	.03959	.8020	.00153	322.61	151.43	.26774	1.00090	.6840
700.	.2765	10245.9	.03946	.8019	.00143	340.08	159.24	.30322	1.00083	.6839
750.	.2581	11006.6	.03930	.8018	.00133	357.47	166.88	.34051	1.00078	.6837
800.	.2420	11778.7	.03911	.8017	.00125	374.84	174.36	.37953	1.00073	.6835
850.	.2278	12563.7	.03889	.8016	.00117	392.22	181.69	.42021	1.00069	.6834
900.	.2151	13363.1	.03863	.8015	.00111	409.65	188.90	.46252	1.00065	.6835
950.	.2038	14177.6	.03835	.8014	.00105	427.15	195.98	.50639	1.00061	.6836
1000.	.1936	15008.0	.03805	.8014	.00100	444.73	202.96	.55178	1.00058	.6838
1100.	.1761	16705.5	.03742	.8012	.00091	475.56	216.60	.64121	1.00053	.6907
1200.	.1614	18461.9	.03675	.8011	.00083	511.01	229.88	.74180	1.00049	.6911
1300.	.1490	20276.4	.03606	.8011	.00077	546.92	242.83	.84820	1.00045	.6916
1400.	.1384	22147.5	.03537	.8010	.00071	583.29	255.50	.96032	1.00042	.6921
1500.	.1292	24073.8	.03468	.8009	.00067	620.17	267.90	1.07816	1.00039	.6925
1600.	.1211	26041.6	.03403	.8009	.00062	657.39	280.05	1.20191	1.00036	.6926
1700.	.1140	28073.9	.03338	.8008	.00059	695.82	291.97	1.33203	1.00034	.6923
1800.	.1077	30196.8	.03269	.8007	.00056	736.56	303.67	1.46950	1.00032	.6910
2000.	.0969	34926.6	.03105	.8005	.00050	833.46	326.45	1.77454	1.00029	.6836
2200.	.0880	40976.0	.02869	.7998	.00045	976.43	344.98	2.14382	1.00027	.6582
2400.	.0805	49603.9	.02537	.7983	.00042	1213.23	366.53	2.61834	1.00024	.6257
2600.	.0741	62660.6	.02131	.7951	.00039	1613.06	387.98	3.23392	1.00022	.5832
2800.	.0682	82427.0	.01713	.7890	.00036	2260.84	409.74	3.99580	1.00021	.5409
3000.	.0629	111251.3	.01345	.7786	.00034	3244.24	432.37	4.87643	1.00019	.5078

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.85 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.084	.01290	1.2245	.9330	218.5	229.5	14.101	4.71	6.38	1287.
15.	.01303	1.1407	.9325	224.5	235.6	14.518	4.90	6.84	1262.
16.	.01317	1.0581	.9170	231.4	242.6	14.973	5.09	7.29	1232.
17.	.01333	.9909	.9012	238.8	250.1	15.429	5.27	7.74	1207.
18.	.01349	.9271	.8864	246.7	258.1	15.885	5.43	8.21	1184.
19.	.01368	.8650	.8713	255.0	266.6	16.343	5.58	8.70	1161.
20.	.01387	.8007	.8547	263.7	275.5	16.802	5.71	9.22	1137.
22.	.01432	.6714	.8156	282.9	295.1	17.736	5.92	10.40	1085.
24.	.01489	.5372	.7651	304.7	317.3	18.703	6.07	11.87	1025.
26.	.01561	.4016	.6969	329.7	342.9	19.724	6.18	13.85	949.
28.	.01665	.2619	.6055	359.4	373.6	20.858	6.30	17.16	845.
30.	.01846	.1208	.4807	399.1	414.8	22.277	6.50	26.06	696.
* 30.205	.01876	.1058	.4640	404.4	420.4	22.461	6.54	28.17	675.
* 30.205	.08797	.0316	.0598	628.4	703.1	31.827	7.56	34.05	377.
32.	.10859	.0569	.0456	657.2	749.5	33.321	7.05	20.87	410.
34.	.12567	.0766	.0381	679.9	786.8	34.453	6.77	16.93	438.
36.	.14053	.0930	.0333	699.1	818.6	35.364	6.59	15.09	461.
38.	.15420	.1075	.0299	716.6	847.6	36.150	6.50	14.04	482.
40.	.16712	.1209	.0273	732.9	875.0	36.851	6.44	13.34	500.
42.	.17952	.1335	.0252	748.6	901.2	37.489	6.40	12.85	518.
44.	.19152	.1454	.0235	763.7	926.5	38.078	6.38	12.49	534.
46.	.20322	.1569	.0220	778.5	951.2	38.627	6.36	12.21	549.
48.	.21468	.1680	.0207	792.9	975.4	39.142	6.35	11.99	563.
50.	.22594	.1788	.0196	807.1	999.2	39.627	6.34	11.81	577.
55.	.25343	.2048	.0173	841.9	1057.3	40.737	6.33	11.49	609.
60.	.28023	.2296	.0155	876.0	1114.2	41.727	6.35	11.29	639.
65.	.30655	.2536	.0141	909.8	1170.3	42.624	6.38	11.17	666.
70.	.33251	.2770	.0129	943.4	1226.0	43.450	6.43	11.11	692.
75.	.35821	.3000	.0120	977.0	1281.5	44.216	6.51	11.10	715.
80.	.38370	.3227	.0111	1010.9	1337.1	44.933	6.60	11.12	738.
90.	.43422	.3673	.0098	1079.8	1448.9	46.251	6.82	11.25	778.
100.	.48430	.4111	.0087	1150.7	1562.3	47.445	7.09	11.45	815.
110.	.53405	.4544	.0079	1224.2	1678.1	48.546	7.38	11.70	849.
120.	.58357	.4973	.0072	1300.4	1796.4	49.576	7.68	11.96	880.
140.	.68215	.5824	.0062	1461.0	2040.8	51.458	8.23	12.47	939.
160.	.78030	.6667	.0054	1631.5	2294.7	53.152	8.71	12.91	994.
180.	.87817	.7506	.0048	1810.4	2556.8	54.695	9.10	13.29	1047.
200.	.97586	.8342	.0043	1996.1	2825.6	56.111	9.41	13.58	1097.
220.	1.07342	.9175	.0039	2187.4	3099.8	57.418	9.66	13.82	1146.
240.	1.17087	1.0007	.0036	2383.0	3378.2	58.629	9.85	14.01	1193.
260.	1.26825	1.0837	.0033	2581.8	3659.9	59.757	10.00	14.15	1238.
280.	1.36558	1.1667	.0030	2783.2	3944.0	60.809	10.11	14.25	1283.
300.	1.46279	1.2496	.0028	2986.7	4230.0	61.795	10.19	14.33	1326.
350.	1.70580	1.4565	.0024	3499.8	4949.7	64.015	10.30	14.44	1429.
400.	1.94868	1.6631	.0021	4016.7	5673.0	65.947	10.35	14.49	1525.
450.	2.19148	1.8697	.0019	4535.2	6398.0	67.654	10.37	14.50	1617.
500.	2.43423	2.0761	.0017	5054.5	7123.6	69.182	10.39	14.52	1703.
550.	2.67694	2.2825	.0015	5574.4	7849.8	70.567	10.40	14.53	1785.
600.	2.91963	2.4889	.0014	6095.3	8577.0	71.829	10.42	14.55	1864.
650.	3.16230	2.6952	.0013	6617.0	9305.0	72.991	10.45	14.57	1939.
700.	3.40496	2.9015	.0012	7140.4	10034.6	74.079	10.48	14.61	2011.
750.	3.64760	3.1078	.0011	7665.7	10766.1	75.090	10.52	14.65	2080.
800.	3.89024	3.3141	.0011	8193.0	11499.7	76.038	10.57	14.69	2147.
850.	4.13287	3.5203	.0010	8723.2	12236.2	76.930	10.63	14.75	2211.
900.	4.37550	3.7266	.0009	9256.5	12975.6	77.774	10.70	14.82	2272.
950.	4.61812	3.9328	.0009	9793.2	13718.6	78.576	10.77	14.90	2332.
1000.	4.86074	4.1391	.0009	10333.6	14465.2	79.341	10.86	14.98	2390.
1100.	5.34597	4.5516	.0008	11429.1	15973.2	80.768	11.04	15.16	2500.
1200.	5.83119	4.9640	.0007	12543.9	17500.5	82.089	11.24	15.36	2605.
1300.	6.31641	5.3765	.0007	13679.5	19048.5	83.327	11.45	15.58	2704.
1400.	6.80163	5.7889	.0006	14836.7	20618.1	84.498	11.68	15.80	2799.
1500.	7.28686	6.2014	.0006	16015.8	22209.7	85.610	11.91	16.03	2890.
1600.	7.77212	6.6138	.0005	17216.5	23822.8	86.644	12.13	16.26	2977.
1700.	8.25746	7.0262	.0005	18440.4	25459.2	87.632	12.37	16.50	3061.
1800.	8.74299	7.4387	.0005	19689.4	27121.0	88.580	12.63	16.76	3142.
2000.	9.71559	8.2635	.0004	22278.4	30536.7	90.390	13.28	17.44	3294.
2200.	10.69365	9.0884	.0004	25034.7	34124.3	92.091	14.36	18.59	3429.
2400.	11.68566	9.9132	.0004	28088.7	38021.5	93.780	16.23	20.52	3548.
2600.	12.70769	10.7381	.0003	31655.9	42457.5	95.554	19.33	24.06	3654.
2800.	13.78641	11.5629	.0003	36056.0	47774.4	97.527	24.13	29.50	3757.
3000.	14.96167	12.3877	.0003	41714.6	54432.0	99.830	31.04	37.52	3865.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.85 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.084	77.4930	649.0	.25541	94.8874	.00983	76.03	260.05	.00055	1.25325	2.1828
15.	76.7682	642.2	.24796	87.5695	.01065	84.01	231.15	.00058	1.25070	1.8817
16.	75.9357	639.0	.23736	80.3490	.01141	90.21	205.92	.00059	1.24778	1.6647
17.	75.0421	638.8	.22801	74.3625	.01212	94.32	185.33	.00058	1.24464	1.5210
18.	74.1057	636.3	.22021	68.7039	.01290	97.27	168.40	.00058	1.24136	1.4213
19.	73.1220	631.5	.21352	63.2535	.01377	99.04	154.21	.00056	1.23792	1.3545
20.	72.0844	622.8	.20761	57.7204	.01481	100.63	142.09	.00054	1.23430	1.3022
22.	69.8106	597.5	.19721	46.8740	.01740	103.54	122.23	.00051	1.22639	1.2272
24.	67.1799	559.9	.18750	36.0897	.02120	103.67	106.13	.00047	1.21728	1.2151
26.	64.0425	511.0	.17608	25.7209	.02709	101.30	92.21	.00041	1.20648	1.2603
28.	60.0641	445.9	.16008	15.7307	.03849	96.26	79.17	.00034	1.19287	1.4116
30.	54.1644	354.7	.13655	6.5442	.07346	87.05	65.05	.00022	1.17287	1.9474
* 30.205	53.3063	342.3	.13319	5.6395	.08228	85.80	63.34	.00021	1.16998	2.0793
* 30.205	11.3673	204.3	.06965	.3589	.16666	39.20	19.47	.00036	1.03467	1.6913
32.	9.2087	239.6	.07026	.5239	.08710	34.22	19.53	.00064	1.02802	1.1906
34.	7.9573	271.1	.07069	.6096	.06245	33.53	20.08	.00090	1.02418	1.0135
36.	7.1160	299.5	.07107	.6615	.05040	33.86	20.76	.00113	1.02161	.9255
38.	6.4850	326.7	.07108	.6972	.04296	34.57	21.49	.00137	1.01968	.8725
40.	5.9836	353.2	.07092	.7234	.03778	35.48	22.25	.00160	1.01815	.8368
42.	5.5705	378.9	.07071	.7435	.03392	36.48	23.01	.00183	1.01689	.8109
44.	5.2214	404.1	.07048	.7594	.03091	37.55	23.78	.00207	1.01582	.7910
46.	4.9208	428.9	.07024	.7722	.02847	38.66	24.54	.00232	1.01491	.7752
48.	4.6582	453.3	.07000	.7827	.02644	39.79	25.30	.00257	1.01411	.7623
50.	4.4260	477.4	.06977	.7915	.02473	40.92	26.06	.00282	1.01340	.7518
55.	3.9459	537.0	.06915	.8080	.02139	43.75	27.91	.00348	1.01194	.7328
60.	3.5685	596.0	.06849	.8192	.01894	46.54	29.72	.00416	1.01079	.7208
65.	3.2622	655.3	.06774	.8272	.01704	49.49	31.48	.00489	1.00986	.7105
70.	3.0074	715.5	.06687	.8332	.01553	52.22	33.20	.00563	1.00909	.7064
75.	2.7917	776.9	.06588	.8376	.01429	54.90	34.87	.00638	1.00844	.7050
80.	2.6062	840.0	.06478	.8411	.01324	57.33	36.51	.00712	1.00787	.7082
90.	2.3030	972.1	.06232	.8458	.01158	63.76	39.66	.00886	1.00696	.7000
100.	2.0648	1111.7	.05975	.8489	.01030	69.64	42.69	.01060	1.00624	.7021
110.	1.8725	1259.1	.05719	.8509	.00929	77.09	44.92	.01267	1.00565	.6818
120.	1.7136	1411.9	.05487	.8522	.00847	83.60	47.73	.01469	1.00517	.6828
140.	1.4660	1730.0	.05098	.8537	.00721	96.66	53.11	.01904	1.00442	.6852
160.	1.2816	2056.7	.04807	.8544	.00628	109.64	58.24	.02385	1.00387	.6859
180.	1.1387	2386.6	.04592	.8547	.00557	122.28	63.14	.02910	1.00344	.6860
200.	1.0247	2716.0	.04433	.8548	.00500	134.43	67.87	.03477	1.00309	.6858
220.	.9316	3043.9	.04313	.8547	.00454	146.02	72.44	.04082	1.00281	.6858
240.	.8541	3367.6	.04225	.8546	.00416	157.04	76.88	.04725	1.00258	.6858
260.	.7885	3686.9	.04159	.8545	.00384	167.55	81.20	.05406	1.00238	.6857
280.	.7323	4001.5	.04111	.8544	.00356	177.57	85.41	.06124	1.00221	.6856
300.	.6836	4311.5	.04076	.8542	.00332	187.17	89.52	.06878	1.00206	.6854
350.	.5862	5069.5	.04026	.8538	.00285	209.64	99.43	.08915	1.00177	.6849
400.	.5132	5812.0	.04004	.8535	.00249	230.43	108.89	.11160	1.00155	.6845
450.	.4563	6545.8	.03994	.8532	.00222	250.05	117.97	.13603	1.00138	.6842
500.	.4108	7280.7	.03985	.8529	.00199	268.86	126.77	.16227	1.00124	.6844
550.	.3736	8014.7	.03978	.8527	.00181	287.12	135.20	.19040	1.00113	.6843
600.	.3425	8752.9	.03969	.8525	.00166	304.99	143.42	.22031	1.00103	.6842
650.	.3162	9495.4	.03960	.8523	.00153	322.62	151.43	.25203	1.00095	.6840
700.	.2937	10247.4	.03946	.8521	.00143	340.09	159.24	.28543	1.00089	.6839
750.	.2742	11008.1	.03930	.8520	.00133	357.48	166.88	.32052	1.00083	.6837
800.	.2571	11780.2	.03911	.8519	.00125	374.84	174.36	.35725	1.00077	.6835
850.	.2420	12565.3	.03889	.8518	.00117	392.22	181.70	.39555	1.00073	.6834
900.	.2285	13364.6	.03864	.8517	.00111	409.65	188.90	.43536	1.00069	.6835
950.	.2165	14179.2	.03836	.8516	.00105	427.15	195.98	.47666	1.00065	.6836
1000.	.2057	15009.5	.03805	.8515	.00100	444.73	202.96	.51938	1.00062	.6838
1100.	.1871	16707.2	.03742	.8514	.00091	475.56	216.60	.60355	1.00056	.6907
1200.	.1715	18463.5	.03675	.8513	.00083	511.01	229.88	.69822	1.00052	.6911
1300.	.1583	20278.1	.03606	.8512	.00077	546.92	242.83	.79837	1.00048	.6916
1400.	.1470	22149.1	.03537	.8511	.00071	583.28	255.50	.90390	1.00044	.6921
1500.	.1372	24075.2	.03468	.8510	.00067	620.15	267.90	1.01480	1.00041	.6925
1600.	.1287	26042.3	.03403	.8510	.00062	657.35	280.05	1.13126	1.00039	.6927
1700.	.1211	28072.8	.03338	.8509	.00059	695.71	291.97	1.25368	1.00036	.6923
1800.	.1144	30192.2	.03270	.8508	.00056	736.31	303.67	1.38296	1.00034	.6911
2000.	.1029	34902.2	.03108	.8505	.00050	832.45	326.45	1.66947	1.00031	.6839
2200.	.0935	40895.0	.02876	.8499	.00045	973.26	344.97	2.01534	1.00028	.6590
2400.	.0856	49391.5	.02550	.8483	.00042	1205.09	366.52	2.45851	1.00026	.6272
2600.	.0787	62187.8	.02150	.8450	.00039	1595.11	387.95	3.03295	1.00024	.5852
2800.	.0725	81502.3	.01734	.8387	.00036	2225.94	409.67	3.74499	1.00022	.5429
3000.	.0668	109629.5	.01366	.8280	.00034	3183.25	432.23	4.57024	1.00020	.5094

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.90 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.100	.01290	1.2278	.9336	218.6	230.2	14.103	4.72	6.38	1289.
15.	.01302	1.1472	.9331	224.4	236.1	14.511	4.90	6.83	1265.
16.	.01316	1.0633	.9185	231.3	243.2	14.965	5.09	7.28	1234.
17.	.01332	.9959	.9027	238.7	250.7	15.421	5.27	7.73	1209.
18.	.01348	.9319	.8879	246.5	258.6	15.877	5.43	8.20	1186.
19.	.01367	.8700	.8728	254.8	267.1	16.333	5.58	8.68	1164.
20.	.01386	.8057	.8562	263.6	276.0	16.792	5.71	9.20	1140.
22.	.01431	.6767	.8172	282.7	295.6	17.724	5.92	10.37	1088.
24.	.01486	.5428	.7672	304.3	317.7	18.687	6.07	11.82	1028.
26.	.01558	.4081	.6998	329.1	343.2	19.703	6.18	13.76	953.
28.	.01660	.2691	.6099	358.6	373.5	20.826	6.29	16.96	851.
30.	.01833	.1312	.4891	397.3	413.8	22.211	6.48	24.86	709.
* 30.567	.01918	.0889	.4424	412.2	429.5	22.730	6.58	31.34	650.
* 30.567	.08139	.0281	.0656	624.3	697.6	31.506	7.67	38.60	376.
32.	.09864	.0507	.0511	650.5	739.3	32.841	7.18	23.21	405.
34.	.11588	.0721	.0418	675.2	779.5	34.063	6.83	17.87	434.
36.	.13047	.0893	.0362	695.4	812.8	35.014	6.63	15.64	459.
38.	.14374	.1044	.0324	713.3	842.7	35.824	6.52	14.40	480.
40.	.15620	.1182	.0294	730.1	870.7	36.541	6.46	13.61	499.
42.	.16811	.1311	.0271	746.0	897.3	37.191	6.42	13.06	517.
44.	.17961	.1433	.0252	761.4	923.0	37.789	6.39	12.66	533.
46.	.19079	.1550	.0235	776.3	948.0	38.344	6.37	12.35	548.
48.	.20173	.1663	.0221	790.9	972.5	38.865	6.36	12.11	563.
50.	.21246	.1773	.0209	805.3	996.5	39.355	6.35	11.91	577.
55.	.23862	.2035	.0184	840.3	1055.1	40.472	6.34	11.56	609.
60.	.26408	.2286	.0165	874.6	1112.3	41.469	6.35	11.34	639.
65.	.28905	.2528	.0150	908.5	1168.7	42.370	6.38	11.21	666.
70.	.31367	.2764	.0138	942.3	1224.6	43.199	6.44	11.15	692.
75.	.33802	.2996	.0127	976.0	1280.2	43.967	6.51	11.13	716.
80.	.36216	.3224	.0118	1010.0	1335.9	44.686	6.60	11.15	738.
90.	.40998	.3671	.0104	1079.0	1448.0	46.036	6.82	11.27	779.
100.	.45736	.4111	.0093	1150.0	1561.6	47.203	7.09	11.47	815.
110.	.50441	.4545	.0084	1223.6	1677.5	48.305	7.39	11.71	849.
120.	.55124	.4975	.0077	1299.8	1795.9	49.335	7.68	11.97	881.
140.	.64442	.5827	.0065	1460.5	2040.5	51.219	8.23	12.48	940.
160.	.73717	.6671	.0057	1631.1	2294.5	52.914	8.71	12.92	995.
180.	.82966	.7511	.0050	1810.0	2556.7	54.458	9.10	13.29	1047.
200.	.92195	.8347	.0045	1995.8	2825.6	55.874	9.41	13.59	1098.
220.	1.01411	.9181	.0041	2187.1	3099.8	57.181	9.66	13.83	1146.
240.	1.10618	1.0013	.0038	2382.7	3378.3	58.393	9.85	14.01	1193.
260.	1.19817	1.0844	.0035	2581.6	3660.0	59.520	10.00	14.15	1239.
280.	1.29010	1.1674	.0032	2783.1	3944.2	60.573	10.11	14.26	1283.
300.	1.38193	1.2503	.0030	2986.5	4230.2	61.559	10.19	14.33	1326.
350.	1.61146	1.4572	.0026	3499.7	4950.0	63.779	10.30	14.44	1429.
400.	1.84086	1.6639	.0023	4016.6	5673.3	65.711	10.35	14.49	1526.
450.	2.07019	1.8705	.0020	4535.1	6398.3	67.418	10.37	14.50	1617.
500.	2.29945	2.0770	.0018	5054.4	7123.9	68.946	10.39	14.52	1704.
550.	2.52869	2.2834	.0016	5574.3	7850.1	70.331	10.40	14.53	1786.
600.	2.75790	2.4897	.0015	6095.3	8577.4	71.593	10.42	14.55	1864.
650.	2.98709	2.6961	.0014	6617.0	9305.4	72.756	10.45	14.57	1939.
700.	3.21627	2.9024	.0013	7140.3	10035.0	73.844	10.48	14.61	2011.
750.	3.44544	3.1087	.0012	7665.6	10766.5	74.854	10.52	14.65	2080.
800.	3.67460	3.3149	.0011	8193.0	11500.1	75.802	10.57	14.69	2147.
850.	3.90375	3.5212	.0011	8723.2	12236.6	76.694	10.63	14.75	2211.
900.	4.13290	3.7275	.0010	9256.4	12976.1	77.538	10.70	14.82	2273
950.	4.36204	3.9337	.0009	9793.1	13719.0	78.340	10.77	14.90	2332.
1000.	4.59118	4.1400	.0009	10333.6	14465.7	79.106	10.86	14.98	2390.
1100.	5.04946	4.5524	.0008	11429.1	15973.6	80.532	11.04	15.16	2501.
1200.	5.50773	4.9649	.0008	12543.9	17500.9	81.853	11.24	15.36	2605.
1300.	5.96599	5.3774	.0007	13679.5	19048.9	83.092	11.45	15.58	2704.
1400.	6.42425	5.7898	.0006	14836.7	20618.5	84.262	11.68	15.80	2799.
1500.	6.88252	6.2023	.0006	16015.8	22210.1	85.374	11.91	16.03	2890.
1600.	7.34082	6.6147	.0006	17216.4	23823.1	86.408	12.13	16.26	2977.
1700.	7.79920	7.0271	.0005	18440.2	25459.5	87.396	12.37	16.49	3061.
1800.	8.25775	7.4396	.0005	19689.0	27121.0	88.344	12.62	16.75	3142.
2000.	9.17625	8.2644	.0005	22276.7	30535.4	90.153	13.27	17.43	3294.
2200.	10.09978	9.0893	.0004	25028.8	34118.6	91.852	14.33	18.56	3430.
2400.	11.03610	9.9141	.0004	28071.9	38004.4	93.537	16.15	20.54	3549.
2600.	11.99998	10.7390	.0003	31615.6	42415.6	95.300	19.17	23.89	3656.
2800.	13.01590	11.5638	.0003	35970.1	47684.4	97.255	23.85	29.18	3759.
3000.	14.12044	12.3886	.0003	41549.2	54257.6	99.529	30.58	36.98	3867.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.90 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.100	77.5208	650.6	.25535	95.1791	.00981	76.23	260.36	.00055	1.25335	2.1798
15.	76.8115	644.7	.24804	88.1146	.01059	84.07	231.93	.00058	1.25085	1.8836
16.	75.9818	640.8	.23767	80.7877	.01137	90.28	206.61	.00059	1.24794	1.6671
17.	75.0917	640.5	.22831	74.7803	.01207	94.42	185.94	.00059	1.24482	1.5227
18.	74.1591	638.2	.22049	69.1097	.01285	97.38	168.95	.00058	1.24155	1.4225
19.	73.1793	633.5	.21380	63.6661	.01371	99.16	154.72	.00056	1.23812	1.3550
20.	72.1462	624.9	.20788	58.1271	.01473	100.77	142.56	.00055	1.23452	1.3023
22.	69.8844	599.9	.19747	47.2907	.01728	103.72	122.66	.00052	1.22665	1.2261
24.	67.2723	562.8	.18778	36.5169	.02101	103.89	106.55	.00047	1.21760	1.2126
26.	64.1659	514.8	.17651	26.1854	.02673	101.60	92.65	.00041	1.20690	1.2547
28.	60.2507	450.8	.16085	16.2152	.03761	96.69	79.70	.00034	1.19350	1.3975
30.	54.5650	363.7	.13827	7.1562	.06834	87.88	65.89	.00023	1.17422	1.8638
* 30.567	52.1365	328.3	.12886	4.6342	.09546	85.67	61.14	.00019	1.16605	2.2366
* 30.567	12.2868	203.6	.06963	.3458	.18963	41.99	20.06	.00032	1.03752	1.8445
32.	10.1382	233.6	.07028	.5144	.09938	35.77	19.87	.00055	1.03088	1.2893
34.	8.6298	266.3	.07086	.6224	.06711	34.36	20.30	.00080	1.02625	1.0560
36.	7.6647	295.4	.07134	.6846	.05293	34.45	20.93	.00103	1.02329	.9501
38.	6.9569	323.1	.07138	.7264	.04457	35.04	21.64	.00126	1.02112	.8890
40.	6.4019	349.9	.07122	.7568	.03890	35.88	22.37	.00148	1.01942	.8488
42.	5.9485	376.0	.07100	.7799	.03474	36.83	23.12	.00171	1.01804	.8201
44.	5.5677	401.5	.07074	.7980	.03153	37.87	23.88	.00193	1.01688	.7984
46.	5.2414	426.5	.07049	.8126	.02896	38.95	24.64	.00217	1.01588	.7812
48.	4.9572	451.1	.07024	.8245	.02684	40.05	25.39	.00240	1.01502	.7674
50.	4.7068	475.4	.06998	.8344	.02505	41.17	26.14	.00264	1.01425	.7561
55.	4.1908	535.3	.06933	.8530	.02160	43.97	27.99	.00327	1.01268	.7359
60.	3.7868	594.6	.06865	.8656	.01908	46.73	29.79	.00392	1.01146	.7230
65.	3.4596	654.1	.06789	.8746	.01714	49.66	31.54	.00461	1.01046	.7122
70.	3.1881	714.5	.06701	.8813	.01560	52.39	33.25	.00531	1.00964	.7077
75.	2.9584	776.1	.06600	.8863	.01434	55.04	34.92	.00602	1.00894	.7062
80.	2.7612	839.3	.06490	.8901	.01328	57.46	36.55	.00672	1.00834	.7091
90.	2.4391	971.6	.06241	.8954	.01160	63.88	39.70	.00836	1.00737	.7006
100.	2.1865	1111.3	.05984	.8988	.01032	69.75	42.72	.01001	1.00660	.7025
110.	1.9825	1258.9	.05726	.9010	.00930	77.14	44.93	.01196	1.00599	.6822
120.	1.8141	1411.9	.05493	.9025	.00848	83.65	47.74	.01387	1.00548	.6832
140.	1.5518	1730.2	.05102	.9042	.00721	96.70	53.12	.01798	1.00468	.6854
160.	1.3565	2057.0	.04811	.9050	.00628	109.67	58.24	.02253	1.00409	.6861
180.	1.2053	2387.1	.04595	.9053	.00557	122.31	63.15	.02749	1.00364	.6861
200.	1.0847	2716.7	.04436	.9054	.00500	134.45	67.87	.03284	1.00327	.6859
220.	.9861	3044.7	.04315	.9053	.00454	146.03	72.45	.03856	1.00297	.6859
240.	.9040	3368.5	.04227	.9052	.00416	157.06	76.88	.04464	1.00273	.6859
260.	.8346	3687.9	.04161	.9051	.00384	167.56	81.20	.05107	1.00252	.6858
280.	.7751	4002.5	.04113	.9049	.00356	177.59	85.41	.05785	1.00234	.6857
300.	.7236	4312.7	.04078	.9047	.00332	187.19	89.52	.06498	1.00218	.6855
350.	.6206	5070.8	.04027	.9043	.00285	209.65	99.44	.08422	1.00187	.6849
400.	.5432	5813.3	.04005	.9039	.00249	230.44	108.90	.10542	1.00164	.6845
450.	.4830	6547.2	.03995	.9035	.00222	250.06	117.97	.12850	1.00146	.6842
500.	.4349	7282.1	.03985	.9032	.00199	268.87	126.73	.15329	1.00131	.6844
550.	.3955	8016.1	.03979	.9030	.00181	287.12	135.20	.17985	1.00119	.6843
600.	.3626	8754.3	.03970	.9028	.00166	305.00	143.42	.20811	1.00109	.6842
650.	.3348	9496.9	.03960	.9026	.00153	322.62	151.43	.23806	1.00101	.6840
700.	.3109	10248.9	.03947	.9024	.00143	340.09	159.24	.26961	1.00094	.6839
750.	.2902	11009.6	.03931	.9023	.00133	357.48	166.88	.30276	1.00087	.6837
800.	.2721	11781.7	.03912	.9021	.00125	374.85	174.36	.33745	1.00082	.6835
850.	.2562	12566.8	.03890	.9020	.00117	392.23	181.70	.37362	1.00077	.6834
900.	.2420	13366.2	.03864	.9019	.00111	409.66	188.90	.41123	1.00073	.6835
950.	.2293	14180.8	.03836	.9018	.00105	427.15	195.98	.45023	1.00069	.6836
1000.	.2178	15011.1	.03806	.9017	.00100	444.74	202.96	.49058	1.00066	.6838
1100.	.1980	16708.8	.03743	.9016	.00091	475.56	216.60	.57007	1.00060	.6907
1200.	.1816	18465.1	.03676	.9014	.00083	511.01	229.88	.65949	1.00055	.6911
1300.	.1676	20279.7	.03607	.9013	.00077	546.91	242.83	.75407	1.00051	.6916
1400.	.1557	22150.7	.03537	.9012	.00071	583.28	255.50	.85374	1.00047	.6921
1500.	.1453	24076.5	.03469	.9012	.00067	620.14	267.90	.95848	1.00044	.6925
1600.	.1362	26043.0	.03404	.9011	.00062	657.31	280.05	1.06846	1.00041	.6927
1700.	.1282	28072.1	.03339	.9010	.00059	695.61	291.97	1.18404	1.00039	.6924
1800.	.1211	30188.1	.03271	.9009	.00055	736.08	303.67	1.30606	1.00036	.6912
2000.	.1090	34880.0	.03111	.9006	.00050	831.52	326.45	1.57614	1.00033	.6842
2200.	.0990	40821.1	.02883	.8999	.00045	970.36	344.97	1.90132	1.00030	.6597
2400.	.0906	49197.1	.02562	.8983	.00042	1197.62	366.51	2.31688	1.00027	.6285
2600.	.0833	61754.9	.02167	.8949	.00039	1578.66	387.92	2.85503	1.00025	.5870
2800.	.0768	80655.3	.01754	.8884	.00036	2193.96	409.60	3.52300	1.00023	.5448
3000.	.0708	108142.4	.01385	.8774	.00034	3127.32	432.10	4.29912	1.00021	.5109

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.95 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.117	.01290	1.2311	.9342	218.6	230.8	14.104	4.72	6.38	1290.
15.	.01301	1.1536	.9337	224.3	236.7	14.505	4.90	6.82	1267.
16.	.01315	1.0684	.9199	231.2	243.7	14.958	5.08	7.28	1237.
17.	.01331	1.0007	.9041	238.6	251.2	15.413	5.26	7.72	1212.
18.	.01347	.9367	.8894	246.4	259.2	15.868	5.43	8.19	1189.
19.	.01365	.8749	.8742	254.6	267.6	16.324	5.58	8.67	1166.
20.	.01385	.8106	.8577	263.4	276.5	16.782	5.71	9.19	1142.
22.	.01429	.6819	.8189	282.4	296.0	17.712	5.92	10.34	1091.
24.	.01484	.5484	.7692	304.0	318.1	18.671	6.07	11.78	1031.
26.	.01556	.4145	.7027	328.6	343.4	19.683	6.18	13.67	958.
28.	.01655	.2762	.6142	357.8	373.5	20.796	6.29	16.76	858.
30.	.01820	.1401	.4968	395.6	412.9	22.151	6.47	23.98	721.
* 30.914	.01964	.0734	.4205	420.2	438.9	23.004	6.64	35.36	625.
* 30.914	.07532	.0246	.0719	619.8	691.4	31.176	7.79	44.68	376.
32.	.08934	.0441	.0576	642.9	727.8	32.337	7.32	26.52	400.
34.	.10700	.0675	.0458	670.2	771.9	33.675	6.90	18.99	431.
36.	.12141	.0855	.0393	691.4	806.8	34.673	6.66	16.24	457.
38.	.13435	.1013	.0349	710.0	837.7	35.508	6.54	14.79	479.
40.	.14642	.1155	.0316	727.2	866.3	36.243	6.47	13.89	498.
42.	.15789	.1287	.0290	743.4	893.4	36.905	6.43	13.28	516.
44.	.16894	.1412	.0269	759.0	919.5	37.511	6.40	12.83	532.
46.	.17967	.1531	.0251	774.2	944.9	38.074	6.38	12.49	548.
48.	.19014	.1646	.0236	788.9	969.6	38.600	6.36	12.23	562.
50.	.20040	.1758	.0223	803.4	993.8	39.095	6.35	12.01	576.
55.	.22537	.2023	.0196	838.7	1052.8	40.221	6.35	11.64	609.
60.	.24963	.2276	.0175	873.2	1110.4	41.223	6.36	11.40	639.
65.	.27340	.2521	.0159	907.3	1167.0	42.128	6.39	11.26	667.
70.	.29681	.2758	.0146	941.1	1223.1	42.960	6.44	11.19	692.
75.	.31995	.2991	.0135	975.0	1279.0	43.731	6.51	11.16	716.
80.	.34289	.3220	.0125	1009.1	1334.8	44.452	6.60	11.17	738.
90.	.38829	.3669	.0110	1078.2	1447.0	45.775	6.83	11.29	779.
100.	.43326	.4111	.0098	1149.3	1560.9	46.973	7.09	11.49	816.
110.	.47789	.4546	.0089	1222.9	1676.9	48.076	7.39	11.73	849.
120.	.52231	.4977	.0081	1299.3	1795.5	49.108	7.68	11.98	881.
140.	.61066	.5830	.0069	1460.0	2040.2	50.993	8.24	12.48	940.
160.	.69859	.6676	.0060	1630.7	2294.4	52.688	8.71	12.92	995.
180.	.78625	.7516	.0053	1809.7	2556.6	54.233	9.10	13.29	1048.
200.	.87372	.8353	.0048	1995.6	2825.6	55.650	9.41	13.59	1098.
220.	.96105	.9187	.0043	2186.9	3099.9	56.957	9.66	13.83	1147.
240.	1.04829	1.0020	.0040	2382.5	3378.4	58.169	9.85	14.01	1194.
260.	1.13546	1.0851	.0037	2581.4	3660.1	59.297	10.00	14.15	1239.
280.	1.22257	1.1681	.0034	2782.9	3944.3	60.349	10.11	14.26	1283.
300.	1.30958	1.2510	.0032	2986.4	4230.5	61.336	10.19	14.33	1327.
350.	1.52705	1.4580	.0027	3499.5	4950.2	63.555	10.30	14.44	1429.
400.	1.74439	1.6647	.0024	4016.5	5673.6	65.488	10.35	14.49	1526.
450.	1.96165	1.8713	.0021	4535.1	6398.6	67.195	10.37	14.50	1618.
500.	2.17887	2.0778	.0019	5054.4	7124.3	68.723	10.39	14.52	1704.
550.	2.39604	2.2842	.0017	5574.3	7850.5	70.108	10.41	14.53	1786.
600.	2.61319	2.4906	.0016	6095.2	8577.7	71.370	10.42	14.55	1865.
650.	2.83032	2.6969	.0015	6617.0	9305.8	72.532	10.45	14.57	1940.
700.	3.04744	2.9032	.0014	7140.3	10035.4	73.621	10.48	14.51	2012.
750.	3.26455	3.1095	.0013	7665.6	10766.9	74.631	10.52	14.65	2081.
800.	3.48165	3.3158	.0012	8193.0	11500.6	75.579	10.57	14.69	2147.
850.	3.69875	3.5221	.0011	8723.2	12237.0	76.471	10.63	14.75	2211.
900.	3.91584	3.7283	.0011	9256.4	12976.5	77.315	10.70	14.82	2273.
950.	4.13292	3.9346	.0010	9793.1	13719.4	78.117	10.77	14.90	2333.
1000.	4.35000	4.1408	.0010	10333.6	14466.1	78.883	10.86	14.98	2390.
1100.	4.78416	4.5533	.0009	11429.0	15974.0	80.309	11.04	15.16	2501.
1200.	5.21831	4.9658	.0008	12543.9	17501.3	81.630	11.24	15.36	2605.
1300.	5.65246	5.3782	.0007	13679.5	19049.3	82.869	11.45	15.58	2705.
1400.	6.08660	5.7907	.0007	14836.6	20618.9	84.039	11.68	15.80	2799.
1500.	6.52075	6.2031	.0006	16015.8	22210.5	85.151	11.91	16.03	2890.
1600.	6.95493	6.6156	.0006	17216.3	23823.5	86.185	12.13	16.26	2977.
1700.	7.38918	7.0280	.0006	18440.1	25459.8	87.173	12.37	16.49	3062.
1800.	7.82359	7.4404	.0005	19688.7	27121.1	88.121	12.62	16.75	3143.
2000.	8.69370	8.2653	.0005	22275.1	30534.2	89.929	13.26	17.42	3294.
2200.	9.56844	9.0902	.0004	25023.3	34113.3	91.627	14.30	18.52	3431.
2400.	10.45498	9.9150	.0004	28056.5	37988.8	93.306	16.08	20.46	3551.
2600.	11.36694	10.7398	.0004	31578.5	42377.1	95.061	19.03	23.73	3658.
2800.	12.32689	11.5647	.0003	35891.1	47601.6	97.000	23.59	28.89	3761.
3000.	13.36856	12.3895	.0003	41397.1	54097.2	99.247	30.15	36.48	3868.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

.95 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.117	77.5486	652.3	.25528	95.4704	.00978	76.43	260.68	.00056	1.25345	2.1768
15.	76.8546	647.2	.24811	88.6581	.01053	84.13	232.71	.00058	1.25101	1.8855
16.	76.0277	642.5	.23797	81.2251	.01133	90.36	207.29	.00059	1.24810	1.6696
17.	75.1411	642.3	.22861	75.1966	.01202	94.51	186.55	.00059	1.24499	1.5245
18.	74.2121	640.0	.22078	69.5138	.01279	97.49	169.51	.00058	1.24174	1.4237
19.	73.2363	635.5	.21407	64.0768	.01364	99.28	155.23	.00056	1.23832	1.3556
20.	72.2077	627.0	.20815	58.5320	.01465	100.91	143.04	.00055	1.23473	1.3025
22.	69.9576	602.4	.19773	47.7049	.01717	103.89	123.09	.00052	1.22690	1.2251
24.	67.3636	565.7	.18806	36.9406	.02082	104.12	106.97	.00047	1.21792	1.2101
26.	64.2873	518.4	.17694	26.6442	.02637	101.89	93.09	.00042	1.20732	1.2493
28.	60.4323	455.5	.16158	16.6892	.03680	97.11	80.21	.00035	1.19412	1.3846
30.	54.9325	371.5	.13984	7.6951	.06456	88.65	66.67	.00024	1.17546	1.8038
* 30.914	50.9105	314.4	.12438	3.7385	.11248	85.78	58.95	.00017	1.16194	2.4303
* 30.914	13.2772	202.8	.06955	.3265	.22031	45.46	20.72	.00028	1.04058	2.0362
32.	11.1936	227.3	.07024	.4932	.11669	37.80	20.29	.00046	1.03414	1.4235
34.	9.3462	261.6	.07102	.6307	.07259	35.29	20.55	.00072	1.02845	1.1057
36.	8.2364	291.3	.07162	.7051	.05574	35.08	21.12	.00094	1.02504	.9775
38.	7.4430	319.5	.07168	.7540	.04629	35.54	21.79	.00116	1.02261	.9068
40.	6.8297	346.7	.07152	.7889	.04008	36.29	22.50	.00138	1.02073	.8614
42.	6.3334	373.1	.07129	.8153	.03560	37.20	23.24	.00159	1.01921	.8297
44.	5.9192	398.8	.07101	.8359	.03218	38.19	23.98	.00181	1.01795	.8060
46.	5.5658	424.1	.07074	.8524	.02946	39.24	24.73	.00203	1.01687	.7874
48.	5.2594	448.9	.07047	.8659	.02724	40.32	25.48	.00226	1.01594	.7726
50.	4.9901	473.4	.07020	.8770	.02538	41.43	26.22	.00249	1.01512	.7605
55.	4.4372	533.7	.06952	.8978	.02180	44.19	28.06	.00308	1.01343	.7389
60.	4.0060	593.2	.06882	.9119	.01922	46.93	29.85	.00370	1.01212	.7252
65.	3.6577	653.0	.06804	.9219	.01724	49.84	31.60	.00436	1.01106	.7139
70.	3.3692	713.5	.06714	.9293	.01568	52.55	33.31	.00502	1.01019	.7090
75.	3.1255	775.3	.06613	.9348	.01440	55.18	34.97	.00569	1.00945	.7073
80.	2.9164	838.6	.06501	.9391	.01333	57.60	36.60	.00636	1.00881	.7100
90.	2.5754	971.1	.06251	.9450	.01163	64.00	39.74	.00792	1.00778	.7011
100.	2.3081	1111.0	.05992	.9488	.01034	69.87	42.76	.00949	1.00697	.7029
110.	2.0925	1258.8	.05732	.9512	.00931	77.20	44.95	.01133	1.00632	.6826
120.	1.9146	1411.8	.05499	.9529	.00849	83.70	47.76	.01314	1.00578	.6835
140.	1.6376	1730.4	.05107	.9547	.00721	96.74	53.13	.01704	1.00494	.6856
160.	1.4315	2057.4	.04815	.9556	.00628	109.70	58.25	.02135	1.00432	.6863
180.	1.2719	2387.6	.04599	.9559	.00557	122.34	63.16	.02605	1.00384	.6863
200.	1.1445	2717.4	.04439	.9560	.00500	134.47	67.88	.03112	1.00345	.6860
220.	1.0405	3045.5	.04318	.9559	.00454	146.05	72.45	.03654	1.00314	.6860
240.	.9539	3369.4	.04229	.9558	.00416	157.08	76.89	.04230	1.00288	.6859
260.	.8807	3688.9	.04163	.9556	.00384	167.58	81.20	.04840	1.00266	.6859
280.	.8180	4003.6	.04115	.9554	.00356	177.60	85.41	.05482	1.00247	.6857
300.	.7636	4313.8	.04079	.9553	.00332	187.20	89.53	.06157	1.00230	.6855
350.	.6549	5072.0	.04029	.9548	.00285	209.66	99.44	.07981	1.00197	.6850
400.	.5733	5814.6	.04006	.9543	.00249	230.44	108.90	.09990	1.00173	.6846
450.	.5098	6548.5	.03996	.9539	.00221	250.07	117.98	.12176	1.00154	.6842
500.	.4590	7283.5	.03986	.9536	.00199	268.88	126.73	.14525	1.00138	.6844
550.	.4174	8017.5	.03979	.9533	.00181	287.13	135.20	.17042	1.00126	.6843
600.	.3827	8755.8	.03971	.9531	.00166	305.00	143.43	.19719	1.00115	.6843
650.	.3533	9498.4	.03961	.9529	.00153	322.62	151.43	.22557	1.00106	.6840
700.	.3281	10250.4	.03948	.9527	.00142	340.10	159.24	.25546	1.00099	.6839
750.	.3063	11011.1	.03932	.9525	.00133	357.49	166.88	.28687	1.00092	.6837
800.	.2872	11783.2	.03912	.9524	.00125	374.85	174.36	.31973	1.00087	.6835
850.	.2704	12568.3	.03890	.9522	.00117	392.23	181.70	.35400	1.00081	.6834
900.	.2554	13367.7	.03865	.9521	.00111	409.66	188.90	.38963	1.00077	.6835
950.	.2420	14182.3	.03837	.9520	.00105	427.16	195.99	.42658	1.00073	.6836
1000.	.2299	15012.7	.03806	.9519	.00100	444.74	202.96	.46481	1.00069	.6838
1100.	.2090	16710.4	.03743	.9517	.00091	475.56	216.60	.54012	1.00063	.6907
1200.	.1916	18466.8	.03676	.9516	.00083	511.01	229.88	.62483	1.00058	.6911
1300.	.1769	20281.3	.03607	.9515	.00077	546.91	242.83	.71444	1.00053	.6916
1400.	.1643	22152.3	.03537	.9514	.00071	583.27	255.50	.80887	1.00050	.6921
1500.	.1534	24077.9	.03469	.9513	.00067	620.13	267.90	.90809	1.00046	.6925
1600.	.1438	26043.9	.03404	.9512	.00062	657.27	280.05	1.01227	1.00043	.6927
1700.	.1353	28071.5	.03339	.9511	.00059	695.51	291.97	1.12174	1.00041	.6924
1800.	.1278	30184.5	.03272	.9510	.00055	735.87	303.67	1.23726	1.00039	.6913
2000.	.1150	34859.7	.03114	.9507	.00050	830.67	326.45	1.49268	1.00035	.6845
2200.	.1045	40753.2	.02889	.9500	.00045	967.69	344.97	1.79946	1.00031	.6604
2400.	.0956	49018.5	.02573	.9484	.00042	1190.76	366.50	2.19050	1.00029	.6297
2600.	.0880	61356.8	.02183	.9448	.00039	1563.53	387.89	2.69645	1.00027	.5887
2800.	.0811	79875.6	.01773	.9382	.00036	2164.52	409.54	3.32519	1.00024	.5466
3000.	.0748	106772.3	.01404	.9268	.00034	3075.78	431.98	4.05742	1.00023	.5124

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

1.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.133	.01289	1.2344	.9347	218.6	231.5	14.105	4.72	6.38	1292.
15.	.01300	1.1600	.9343	224.2	237.2	14.498	4.90	6.80	1270.
16.	.01315	1.0735	.9214	231.1	244.2	14.951	5.08	7.27	1239.
17.	.01330	1.0056	.9056	238.4	251.7	15.405	5.26	7.71	1214.
18.	.01347	.9414	.8908	246.2	259.7	15.860	5.43	8.18	1191.
19.	.01364	.8798	.8757	254.5	268.1	16.315	5.57	8.66	1169.
20.	.01384	.8155	.8593	263.2	277.0	16.772	5.70	9.17	1145.
22.	.01428	.6871	.8205	282.2	296.5	17.700	5.32	10.31	1094.
24.	.01482	.5539	.7713	303.6	318.4	18.656	6.07	11.74	1035.
26.	.01553	.4207	.7056	328.1	343.7	19.662	6.18	13.59	962.
28.	.01650	.2850	.6185	357.0	373.5	20.765	6.29	16.52	865.
30.	.01809	.1485	.5041	394.0	412.1	22.094	6.45	23.26	731.
* 31.248	.02016	.0594	.3982	428.5	448.6	23.287	6.70	40.61	600.
* 31.248	.06965	.0213	.0788	614.7	684.4	30.834	7.93	52.16	374.
32.	.08043	.0367	.0654	634.1	714.6	31.790	7.50	31.66	393.
34.	.09887	.0627	.0502	664.9	763.8	33.285	6.97	20.32	427.
36.	.11320	.0818	.0426	687.3	800.5	34.337	6.70	16.91	454.
38.	.12587	.0982	.0375	706.6	832.5	35.202	6.56	15.21	477.
40.	.13759	.1128	.0339	724.3	861.8	35.954	6.49	14.19	497.
42.	.14869	.1264	.0310	740.8	889.5	36.629	6.44	13.51	515.
44.	.15934	.1391	.0287	756.7	916.0	37.245	6.41	13.01	531.
46.	.16965	.1513	.0267	772.0	941.6	37.815	6.39	12.64	547.
48.	.17971	.1629	.0251	786.9	966.6	38.346	6.37	12.35	562.
50.	.18954	.1742	.0236	801.5	991.1	38.846	6.36	12.12	576.
55.	.21345	.2011	.0207	837.1	1050.6	39.980	6.35	11.71	609.
60.	.23663	.2267	.0185	871.9	1108.5	40.989	6.36	11.46	639.
65.	.25931	.2513	.0168	906.0	1165.4	41.898	6.39	11.31	667.
70.	.28164	.2752	.0154	940.0	1221.7	42.733	6.44	11.22	692.
75.	.30370	.2986	.0142	974.0	1277.7	43.506	6.51	11.19	716.
80.	.32554	.3217	.0132	1008.1	1333.7	44.229	6.60	11.20	739.
90.	.36878	.3668	.0116	1077.4	1446.1	45.554	6.83	11.31	780.
100.	.41157	.4111	.0103	1148.6	1560.1	46.754	7.09	11.50	816.
110.	.45403	.4547	.0093	1222.3	1676.4	47.859	7.39	11.74	850.
120.	.49627	.4979	.0085	1298.7	1795.0	48.892	7.68	11.99	882.
140.	.58028	.5833	.0073	1459.6	2039.9	50.778	8.24	12.49	941.
160.	.66386	.6680	.0063	1630.3	2294.2	52.474	8.71	12.93	996.
180.	.74718	.7521	.0056	1809.4	2556.6	54.020	9.10	13.30	1048.
200.	.83031	.8358	.0050	1995.3	2825.6	55.437	9.41	13.59	1099.
220.	.91330	.9193	.0046	2186.6	3099.9	56.744	9.66	13.83	1147.
240.	.99620	1.0026	.0042	2382.3	3378.5	57.956	9.85	14.02	1194.
260.	1.07902	1.0858	.0039	2581.2	3660.3	59.084	10.00	14.16	1240.
280.	1.16179	1.1688	.0036	2782.7	3944.5	60.137	10.11	14.26	1284.
300.	1.24446	1.2517	.0033	2986.2	4230.7	61.124	10.19	14.33	1327.
350.	1.45108	1.4588	.0029	3499.4	4950.5	63.344	10.30	14.44	1430.
400.	1.65757	1.6655	.0025	4016.4	5673.9	65.276	10.35	14.49	1527.
450.	1.86398	1.8721	.0022	4535.0	6399.0	66.983	10.37	14.50	1618.
500.	2.07033	2.0786	.0020	5054.3	7124.6	68.511	10.39	14.52	1704.
550.	2.27666	2.2851	.0018	5574.2	7850.9	69.896	10.41	14.53	1786.
600.	2.48295	2.4914	.0017	6095.2	8578.1	71.159	10.42	14.55	1865.
650.	2.68923	2.6978	.0015	6616.9	9306.1	72.321	10.45	14.57	1940.
700.	2.89550	2.9041	.0014	7140.3	10035.8	73.409	10.48	14.61	2012.
750.	3.10175	3.1104	.0013	7665.6	10767.3	74.420	10.52	14.65	2081.
800.	3.30800	3.3167	.0013	8193.0	11501.0	75.367	10.57	14.69	2147.
850.	3.51424	3.5230	.0012	8723.1	12237.4	76.259	10.63	14.75	2211.
900.	3.72048	3.7292	.0011	9256.4	12976.9	77.104	10.70	14.82	2273.
950.	3.92671	3.9355	.0011	9793.1	13719.8	77.906	10.77	14.90	2333.
1000.	4.13294	4.1417	.0010	10333.6	14466.5	78.671	10.86	14.98	2391.
1100.	4.54539	4.5542	.0009	11429.0	15974.4	80.097	11.04	15.16	2501.
1200.	4.95784	4.9667	.0008	12543.9	17501.7	81.419	11.24	15.36	2606.
1300.	5.37028	5.3791	.0008	13679.5	19049.8	82.657	11.45	15.58	2705.
1400.	5.78271	5.7916	.0007	14836.6	20619.3	83.828	11.68	15.80	2800.
1500.	6.19516	6.2040	.0007	16015.8	22210.9	84.940	11.91	16.03	2890.
1600.	6.60763	6.6165	.0006	17216.3	23823.9	85.974	12.13	16.26	2978.
1700.	7.02016	7.0289	.0006	18439.9	25460.1	86.961	12.36	16.49	3062.
1800.	7.43284	7.4413	.0006	19688.4	27121.2	87.909	12.62	16.75	3143.
2000.	8.25941	8.2662	.0005	22273.7	30533.1	89.717	13.25	17.41	3295.
2200.	9.09025	9.0910	.0005	25018.3	34108.5	91.412	14.28	18.49	3431.
2400.	9.93203	9.9159	.0004	28042.3	37974.3	93.088	16.02	20.39	3552.
2600.	10.79735	10.7407	.0004	31544.2	42341.5	94.834	18.90	23.58	3659.
2800.	11.70709	11.5656	.0004	35818.1	47525.2	96.758	23.35	28.52	3762.
3000.	12.69252	12.3904	.0003	41256.5	53949.0	98.980	29.75	36.03	3869.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

1.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.133	77.5763	654.0	.25522	95.7614	.00976	76.63	260.99	.00056	1.25355	2.1739
15.	76.8975	649.7	.24818	89.1999	.01047	84.18	233.50	.00058	1.25116	1.8875
16.	76.0734	644.3	.23827	81.6612	.01128	90.43	207.98	.00059	1.24826	1.6720
17.	75.1902	644.1	.22890	75.6113	.01198	94.60	187.17	.00059	1.24516	1.5263
18.	74.2648	641.8	.22106	69.9161	.01274	97.59	170.06	.00058	1.24192	1.4249
19.	73.2929	637.5	.21433	64.4858	.01358	99.40	155.74	.00056	1.23852	1.3563
20.	72.2689	629.1	.20842	58.9352	.01458	101.04	143.51	.00055	1.23495	1.3027
22.	70.0303	604.8	.19798	48.1167	.01705	104.07	123.52	.00052	1.22716	1.2242
24.	67.4541	568.5	.18834	37.3608	.02064	104.34	107.38	.00047	1.21823	1.2078
26.	64.4069	522.0	.17735	27.0974	.02604	102.18	93.53	.00042	1.20773	1.2442
28.	60.6157	461.3	.16232	17.2762	.03580	97.53	80.74	.00035	1.19475	1.3671
30.	55.2770	378.6	.14128	8.2063	.06142	89.37	67.41	.00025	1.17662	1.7543
* 31.248	49.6094	300.4	.11970	2.9453	.13519	86.23	56.77	.00015	1.15759	2.6735
* 31.248	14.3567	202.2	.06924	.3054	.25798	49.57	21.45	.00024	1.04393	2.2575
32.	12.4337	220.6	.07011	.4557	.14350	40.72	20.84	.00037	1.03797	1.6200
34.	10.1147	256.8	.07117	.6340	.07916	36.35	20.83	.00064	1.03081	1.1647
36.	8.8336	287.3	.07190	.7230	.05886	35.76	21.32	.00086	1.02687	1.0079
38.	7.9444	315.9	.07200	.7798	.04815	36.06	21.95	.00107	1.02414	.9260
40.	7.2677	343.5	.07183	.8199	.04132	36.72	22.64	.00128	1.02207	.8749
42.	6.7254	370.2	.07158	.8499	.03648	37.57	23.36	.00149	1.02041	.8398
44.	6.2759	396.2	.07129	.8731	.03284	38.52	24.09	.00170	1.01904	.8139
46.	5.8943	421.7	.07099	.8917	.02998	39.54	24.83	.00191	1.01787	.7938
48.	5.5647	446.7	.07071	.9067	.02765	40.60	25.57	.00213	1.01687	.7779
50.	5.2758	471.4	.07042	.9192	.02571	41.68	26.31	.00235	1.01599	.7649
55.	4.6850	532.1	.06971	.9423	.02202	44.41	28.13	.00291	1.01419	.7420
60.	4.2261	591.9	.06899	.9580	.01936	47.12	29.91	.00350	1.01279	.7274
65.	3.8564	651.8	.06819	.9691	.01734	50.02	31.66	.00413	1.01167	.7156
70.	3.5506	712.5	.06728	.9772	.01575	52.71	33.36	.00476	1.01074	.7103
75.	3.2928	774.4	.06625	.9834	.01445	55.32	35.02	.00540	1.00996	.7084
80.	3.0718	837.9	.06513	.9881	.01337	57.73	36.64	.00604	1.00929	.7109
90.	2.7117	970.6	.06261	.9946	.01166	64.13	39.78	.00753	1.00819	.7017
100.	2.4297	1110.6	.06001	.9988	.01035	69.98	42.79	.00902	1.00734	.7033
110.	2.2025	1258.6	.05739	1.0014	.00933	77.26	44.96	.01076	1.00665	.6831
120.	2.0150	1411.8	.05505	1.0032	.00849	83.75	47.77	.01248	1.00608	.6839
140.	1.7233	1730.6	.05112	1.0053	.00722	96.78	53.14	.01619	1.00520	.6859
160.	1.5063	2057.8	.04819	1.0062	.00628	109.74	58.26	.02028	1.00455	.6865
180.	1.3384	2388.2	.04602	1.0066	.00557	122.36	63.16	.02475	1.00404	.6864
200.	1.2044	2718.0	.04441	1.0067	.00500	134.49	67.89	.02957	1.00363	.6861
220.	1.0949	3046.3	.04320	1.0066	.00454	146.07	72.46	.03472	1.00330	.6861
240.	1.0038	3370.3	.04231	1.0064	.00416	157.09	76.89	.04020	1.00303	.6860
260.	.9268	3689.9	.04165	1.0062	.00384	167.59	81.21	.04599	1.00280	.6859
280.	.8607	4004.6	.04116	1.0060	.00356	177.61	85.42	.05209	1.00260	.6858
300.	.8036	4315.0	.04081	1.0059	.00332	187.21	89.53	.05851	1.00242	.6855
350.	.6891	5073.3	.04030	1.0053	.00285	209.67	99.44	.07584	1.00208	.6850
400.	.6033	5815.9	.04007	1.0048	.00249	230.45	108.90	.09492	1.00182	.6846
450.	.5365	6549.9	.03997	1.0044	.00221	250.07	117.98	.11570	1.00162	.6843
500.	.4830	7284.9	.03987	1.0040	.00199	268.88	126.73	.13801	1.00146	.6844
550.	.4392	8019.0	.03980	1.0037	.00181	287.13	135.20	.16193	1.00132	.6843
600.	.4027	8757.2	.03972	1.0034	.00166	305.01	143.43	.18736	1.00121	.6843
650.	.3719	9499.8	.03962	1.0032	.00153	322.63	151.43	.21433	1.00112	.6840
700.	.3454	10251.9	.03948	1.0030	.00142	340.10	159.25	.24272	1.00104	.6839
750.	.3224	11012.6	.03932	1.0028	.00133	357.49	166.88	.27256	1.00097	.6837
800.	.3023	11784.7	.03913	1.0026	.00125	374.85	174.36	.30378	1.00091	.6835
850.	.2846	12569.9	.03891	1.0025	.00117	392.23	181.70	.33634	1.00086	.6834
900.	.2688	13369.3	.03865	1.0023	.00111	409.66	188.90	.37019	1.00081	.6835
950.	.2547	14183.9	.03837	1.0022	.00105	427.16	195.99	.40530	1.00077	.6836
1000.	.2420	15014.3	.03806	1.0021	.00100	444.74	202.96	.44162	1.00073	.6838
1100.	.2200	16712.0	.03743	1.0019	.00091	475.56	216.60	.51316	1.00066	.6907
1200.	.2017	18468.4	.03676	1.0018	.00083	511.01	229.88	.59364	1.00061	.6911
1300.	.1862	20283.0	.03607	1.0016	.00077	546.91	242.84	.67877	1.00056	.6916
1400.	.1729	22153.9	.03538	1.0015	.00071	583.27	255.50	.76848	1.00052	.6921
1500.	.1614	24079.3	.03469	1.0014	.00067	620.11	267.90	.86274	1.00049	.6925
1600.	.1513	26044.8	.03404	1.0013	.00062	657.24	280.05	.95170	1.00046	.6927
1700.	.1424	28071.1	.03340	1.0012	.00059	695.43	291.97	1.06567	1.00043	.6924
1800.	.1345	30181.3	.03273	1.0011	.00055	735.67	303.67	1.17535	1.00041	.6914
2000.	.1211	34841.2	.03116	1.0008	.00050	829.88	326.45	1.41760	1.00036	.6847
2200.	.1100	40690.6	.02894	1.0001	.00045	965.22	344.97	1.70792	1.00033	.6610
2400.	.1007	48853.5	.02584	.9984	.00042	1184.41	366.49	2.07706	1.00030	.6309
2600.	.0926	60988.9	.02198	.9948	.00039	1549.54	387.87	2.55423	1.00028	.5903
2800.	.0854	79154.7	.01791	.9879	.00036	2137.29	409.48	3.14784	1.00026	.5482
3000.	.0788	105504.7	.01422	.9762	.00034	3028.08	431.86	3.84065	1.00024	.5138

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

1.292800 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.229	.01286	1.2537	.9367	218.7	235.4	14.112	4.73	6.38	1300.
15.	.01296	1.1970	.9378	223.7	240.4	14.459	4.89	6.74	1285.
16.	.01310	1.1028	.9299	230.5	247.4	14.909	5.08	7.23	1253.
17.	.01325	1.0336	.9139	237.7	254.8	15.360	5.25	7.66	1228.
18.	.01341	.9688	.8991	245.4	262.7	15.811	5.42	8.12	1205.
19.	.01358	.9102	.8842	253.5	271.1	16.261	5.56	8.57	1184.
20.	.01377	.8467	.8680	262.1	279.9	16.714	5.69	9.07	1161.
22.	.01420	.7166	.8300	280.7	299.1	17.630	5.91	10.17	1111.
24.	.01471	.5882	.7826	301.7	320.7	18.569	6.06	11.47	1055.
26.	.01537	.4570	.7209	325.4	345.2	19.549	6.17	13.16	987.
28.	.01624	.3269	.6411	352.8	373.8	20.604	6.27	15.56	901.
30.	.01755	.1976	.5409	386.1	408.8	21.812	6.40	20.08	787.
32.	.02020	.0718	.3996	434.0	460.1	23.464	6.68	35.71	620.
* 32.976	.03128	-.0001	.1927	521.6	562.0	26.576	9.88	-14527.49	348.
* 32.976	.03241	-.0001	.1868	527.0	568.9	26.786	9.80	-13235.53	351.
34.	.06012	.0298	.0915	621.0	698.7	30.694	7.72	42.28	404.
36.	.07672	.0584	.0669	659.2	758.4	32.405	6.98	23.22	441.
38.	.08886	.0793	.0559	684.6	799.5	33.516	6.71	18.54	468.
40.	.09935	.0969	.0489	705.7	834.1	34.405	6.59	16.34	490.
42.	.10894	.1126	.0439	724.6	865.4	35.169	6.51	15.06	510.
44.	.11795	.1270	.0401	742.2	894.6	35.848	6.47	14.20	528.
46.	.12654	.1405	.0369	758.8	922.4	36.465	6.44	13.60	545.
48.	.13482	.1533	.0344	774.8	949.1	37.034	6.42	13.14	560.
50.	.14286	.1655	.0322	790.3	975.0	37.563	6.40	12.79	575.
55.	.16218	.1944	.0279	827.7	1037.3	38.751	6.39	12.18	609.
60.	.18072	.2214	.0247	863.6	1097.3	39.795	6.39	11.81	640.
65.	.19875	.2471	.0223	898.8	1155.7	40.729	6.41	11.58	668.
70.	.21640	.2720	.0203	933.5	1213.2	41.583	6.46	11.44	694.
75.	.23379	.2961	.0187	968.0	1270.3	42.370	6.53	11.38	718.
80.	.25096	.3198	.0173	1002.7	1327.1	43.103	6.61	11.35	741.
90.	.28483	.3660	.0152	1072.7	1440.9	44.445	6.84	11.43	782.
100.	.31826	.4111	.0135	1144.4	1555.9	45.655	7.10	11.59	819.
110.	.35137	.4553	.0122	1218.7	1673.0	46.768	7.40	11.81	853.
120.	.38425	.4990	.0111	1295.5	1792.2	47.806	7.69	12.05	884.
140.	.44956	.5853	.0094	1456.9	2038.1	49.701	8.24	12.53	943.
160.	.51445	.6705	.0082	1628.1	2293.1	51.402	8.71	12.96	999.
180.	.57907	.7551	.0073	1807.5	2556.1	52.950	9.10	13.32	1051.
200.	.64351	.8392	.0065	1993.6	2825.5	54.369	9.42	13.61	1101.
220.	.70781	.9229	.0059	2185.2	3100.2	55.678	9.66	13.85	1150.
240.	.77202	1.0064	.0054	2381.0	3379.1	56.892	9.86	14.03	1197.
260.	.83616	1.0897	.0050	2580.1	3661.1	58.021	10.00	14.17	1242.
280.	.90024	1.1729	.0046	2781.7	3945.5	59.074	10.11	14.27	1286.
300.	.96425	1.2560	.0043	2985.3	4231.9	60.061	10.19	14.34	1329.
350.	1.12416	1.4633	.0037	3498.7	4952.1	62.282	10.31	14.45	1432.
400.	1.28395	1.6702	.0032	4015.8	5675.7	64.215	10.35	14.49	1529.
450.	1.44365	1.8769	.0029	4534.5	6400.9	65.923	10.37	14.51	1620.
500.	1.60330	2.0835	.0026	5053.9	7126.7	67.452	10.39	14.52	1706.
550.	1.76292	2.2900	.0024	5573.9	7853.0	68.837	10.41	14.53	1788.
600.	1.92252	2.4964	.0022	6094.9	8580.3	70.099	10.42	14.55	1867.
650.	2.08209	2.7028	.0020	6616.7	9308.4	71.261	10.45	14.57	1942.
700.	2.24165	2.9091	.0018	7140.1	10038.1	72.350	10.48	14.61	2014.
750.	2.40120	3.1155	.0017	7665.4	10769.7	73.360	10.52	14.65	2083.
800.	2.56075	3.3218	.0016	8192.8	11503.3	74.308	10.57	14.70	2149.
850.	2.72029	3.5280	.0015	8723.0	12239.8	75.200	10.63	14.75	2213.
900.	2.87982	3.7343	.0014	9256.3	12979.3	76.044	10.70	14.82	2275.
950.	3.03935	3.9406	.0014	9793.0	13722.2	76.846	10.77	14.90	2334.
1000.	3.19888	4.1469	.0013	10333.5	14469.0	77.612	10.86	14.98	2392.
1100.	3.51792	4.5594	.0012	11428.9	15976.9	79.038	11.04	15.16	2503.
1200.	3.83696	4.9718	.0011	12543.8	17504.2	80.360	11.24	15.36	2607.
1300.	4.15599	5.3843	.0010	13679.4	19052.3	81.598	11.45	15.58	2706.
1400.	4.47502	5.7968	.0009	14836.6	20621.9	82.768	11.68	15.80	2801.
1500.	4.79405	6.2092	.0009	16015.6	22213.4	83.880	11.90	16.03	2891.
1600.	5.11310	6.6217	.0008	17216.0	23826.2	84.914	12.13	16.25	2979.
1700.	5.43220	7.0341	.0008	18439.3	25462.0	85.901	12.36	16.49	3063.
1800.	5.75139	7.4465	.0007	19686.8	27122.2	86.849	12.60	16.74	3144.
2000.	6.39059	8.2714	.0006	22266.9	30528.7	88.654	13.21	17.36	3297.
2200.	7.03271	9.0963	.0006	24994.9	34086.7	90.341	14.15	18.36	3435.
2400.	7.68227	9.9211	.0005	27976.3	37907.9	91.998	15.72	20.06	3557.
2600.	8.34784	10.7460	.0005	31385.1	42177.2	93.705	18.28	22.90	3667.
2800.	9.04366	11.5708	.0005	35479.5	47171.1	95.558	22.23	27.36	3771.
3000.	9.79099	12.3957	.0004	40604.3	53262.1	97.666	27.91	33.90	3877.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

1.292800 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	14.229	77.7376	664.1	.25449	97.4607	.00961	77.80	262.81	.00056	1.25411	2.1558
	15.	77.1455	663.8	.24860	92.3420	.01016	84.50	238.11	.00058	1.25203	1.8998
	16.	76.3375	654.5	.23996	84.1885	.01105	90.85	212.01	.00059	1.24919	1.6869
	17.	75.4732	654.2	.23054	78.0093	.01172	95.12	190.76	.00059	1.24615	1.5371
	18.	74.5678	652.2	.22264	72.2386	.01245	98.21	173.31	.00058	1.24298	1.4325
	19.	73.6240	649.8	.21587	67.0094	.01319	100.12	158.77	.00057	1.23968	1.3596
	20.	72.6196	642.4	.20992	61.4904	.01412	101.84	146.28	.00056	1.23617	1.3025
	22.	70.4452	618.6	.19942	50.4817	.01644	105.07	126.02	.00053	1.22860	1.2197
	24.	67.9678	586.1	.18987	39.9775	.01958	105.61	109.81	.00049	1.22001	1.1929
	26.	65.0753	542.6	.17949	29.7379	.02424	103.82	96.02	.00044	1.21003	1.2167
	28.	61.5718	488.4	.16604	20.1288	.03185	99.77	83.56	.00037	1.19801	1.3029
	30.	56.9770	418.0	.14833	11.2605	.04803	93.03	71.26	.00029	1.18237	1.5378
	32.	49.5003	317.8	.12084	3.5564	.11236	85.51	56.75	.00017	1.15723	2.3697
*	32.976	31.9741	198.6	.06098	-.0026	-73.14943	-5797.63	35.91	.00004	1.09971	8.9976
*	32.976	30.8504	199.5	.06181	-.0028	-66.33339	-5279.20	34.93	.00005	1.09609	8.7587
	34.	16.6336	228.8	.07130	.4952	.18481	50.09	24.13	.00026	1.05103	2.0372
	36.	13.0352	264.2	.07358	.7615	.08789	41.39	23.04	.00049	1.03983	1.2925
	38.	11.2542	296.0	.07399	.8927	.06263	39.82	23.16	.00069	1.03432	1.0782
	40.	10.0653	325.7	.07381	.9753	.05017	39.65	23.60	.00087	1.03066	.9727
	42.	9.1792	354.2	.07345	1.0334	.04250	40.01	24.17	.00104	1.02793	.9093
	44.	8.4784	381.8	.07302	1.0767	.03720	40.65	24.80	.00122	1.02578	.8665
	46.	7.9028	408.6	.07259	1.1102	.03328	41.44	25.46	.00139	1.02402	.8353
	48.	7.4174	434.8	.07218	1.1370	.03023	42.33	26.14	.00156	1.02253	.8116
	50.	7.0001	460.5	.07178	1.1588	.02777	43.27	26.83	.00174	1.02125	.7930
	55.	6.1660	523.3	.07085	1.1985	.02329	45.75	28.57	.00219	1.01870	.7610
	60.	5.5334	584.6	.06998	1.2248	.02020	48.30	30.30	.00266	1.01677	.7410
	65.	5.0315	645.7	.06909	1.2433	.01793	51.08	32.01	.00316	1.01524	.7256
	70.	4.6210	707.4	.06809	1.2567	.01618	53.68	33.68	.00365	1.01399	.7180
	75.	4.2774	770.1	.06699	1.2667	.01477	56.16	35.31	.00416	1.01295	.7151
	80.	3.9848	834.2	.06581	1.2743	.01361	58.52	36.91	.00466	1.01206	.7162
	90.	3.5109	968.0	.06319	1.2849	.01180	64.85	40.02	.00582	1.01062	.7051
	100.	3.1421	1109.0	.06051	1.2916	.01045	70.65	43.01	.00698	1.00950	.7055
	110.	2.8460	1258.0	.05780	1.2959	.00939	77.63	45.06	.00832	1.00860	.6855
	120.	2.6025	1411.9	.05540	1.2987	.00853	84.08	47.85	.00965	1.00786	.6858
	140.	2.2244	1731.8	.05139	1.3020	.00724	97.03	53.21	.01253	1.00672	.6872
	160.	1.9438	2060.1	.04841	1.3034	.00629	109.93	58.31	.01571	1.00587	.6875
	180.	1.7269	2391.4	.04620	1.3039	.00557	122.52	63.20	.01917	1.00521	.6872
	200.	1.5540	2722.0	.04457	1.3040	.00500	134.63	67.92	.02291	1.00469	.6868
	220.	1.4128	3051.0	.04334	1.3039	.00454	146.19	72.49	.02690	1.00426	.6866
	240.	1.2953	3375.6	.04243	1.3036	.00416	157.19	76.92	.03114	1.00391	.6864
	260.	1.1959	3695.6	.04176	1.3033	.00383	167.68	81.23	.03563	1.00361	.6863
	280.	1.1108	4010.8	.04126	1.3029	.00356	177.69	85.44	.04036	1.00335	.6861
	300.	1.0371	4321.7	.04090	1.3026	.00332	187.28	89.55	.04533	1.00313	.6858
	350.	.8896	5080.6	.04038	1.3017	.00284	209.72	99.46	.05875	1.00268	.6852
	400.	.7788	5823.6	.04014	1.3008	.00249	230.50	108.91	.07352	1.00235	.6847
	450.	.6927	6557.9	.04002	1.3001	.00221	250.11	117.99	.08960	1.00209	.6843
	500.	.6237	7293.1	.03992	1.2995	.00199	268.92	126.74	.10688	1.00188	.6845
	550.	.5672	8027.4	.03985	1.2990	.00181	287.16	135.21	.12539	1.00171	.6844
	600.	.5202	8765.8	.03976	1.2985	.00166	305.03	143.43	.14507	1.00157	.6843
	650.	.4803	9508.5	.03966	1.2981	.00153	322.65	151.44	.16594	1.00145	.6841
	700.	.4461	10260.6	.03952	1.2978	.00142	340.12	159.25	.18791	1.00134	.6839
	750.	.4165	11021.4	.03936	1.2975	.00133	357.51	166.89	.21100	1.00126	.6837
	800.	.3905	11793.7	.03916	1.2972	.00125	374.87	174.37	.23516	1.00118	.6835
	850.	.3676	12578.9	.03894	1.2969	.00117	392.25	181.70	.26036	1.00111	.6835
	900.	.3472	13378.3	.03868	1.2967	.00111	409.68	188.91	.28655	1.00105	.6835
	950.	.3290	14193.0	.03840	1.2965	.00105	427.18	195.99	.31371	1.00099	.6836
	1000.	.3126	15023.5	.03809	1.2963	.00100	444.76	202.96	.34182	1.00094	.6838
	1100.	.2843	16721.3	.03746	1.2960	.00091	475.56	216.60	.39716	1.00086	.6907
	1200.	.2606	18477.9	.03678	1.2958	.00083	511.01	229.88	.45942	1.00079	.6912
	1300.	.2406	20292.6	.03609	1.2956	.00077	546.91	242.84	.52529	1.00073	.6917
	1400.	.2235	22163.3	.03539	1.2954	.00071	583.25	255.50	.59469	1.00067	.6922
	1500.	.2086	24088.0	.03471	1.2952	.00067	620.06	267.90	.66760	1.00063	.6926
	1600.	.1956	26051.0	.03406	1.2950	.00062	657.08	280.06	.74412	1.00059	.6928
	1700.	.1841	28071.4	.03343	1.2949	.00059	695.03	291.98	.82444	1.00055	.6926
	1800.	.1739	30168.7	.03277	1.2947	.00055	734.77	303.68	.90905	1.00052	.6917
	2000.	.1565	34757.2	.03128	1.2943	.00050	826.22	326.45	1.09503	1.00047	.6859
	2200.	.1422	40402.6	.02921	1.2934	.00045	953.77	344.95	1.31549	1.00043	.6639
	2400.	.1302	48090.6	.02633	1.2914	.00042	1154.97	366.45	1.59239	1.00039	.6364
	2600.	.1198	59283.3	.02270	1.2873	.00039	1484.60	387.76	1.94833	1.00036	.5981
	2800.	.1106	75807.3	.01878	1.2794	.00036	2010.74	409.22	2.39296	1.00033	.5568
	3000.	.1021	99603.9	.01512	1.2660	.00034	2805.93	431.33	2.91717	1.00031	.5212

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

1.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.296	.01285	1.2672	.9378	218.8	238.1	14.117	4.74	6.38	1306.
15.	.01293	1.2227	.9402	223.3	242.7	14.432	4.89	6.70	1295.
16.	.01307	1.1232	.9358	230.0	249.6	14.879	5.07	7.20	1263.
17.	.01321	1.0597	.9197	237.2	257.0	15.327	5.25	7.62	1240.
18.	.01337	.9938	.9049	244.8	264.9	15.775	5.41	8.06	1217.
19.	.01354	.9302	.8898	252.9	273.2	16.224	5.56	8.52	1194.
20.	.01372	.8675	.8738	261.4	282.0	16.674	5.69	9.00	1172.
22.	.01414	.7407	.8365	279.8	301.0	17.583	5.90	10.06	1123.
24.	.01464	.6103	.7902	300.4	322.3	18.511	6.06	11.32	1068.
26.	.01526	.4806	.7310	323.6	346.5	19.474	6.17	12.91	1003.
28.	.01608	.3544	.6555	350.1	374.2	20.501	6.26	15.04	923.
30.	.01726	.2295	.5622	381.7	407.6	21.650	6.38	18.58	820.
32.	.01930	.1106	.4417	423.2	452.2	23.086	6.57	27.51	682.
34.	.03016	.0078	.2048	525.2	570.5	26.640	8.76	174.36	395.
36.	.05798	.0408	.0942	631.9	718.9	30.922	7.27	33.56	434.
38.	.07082	.0656	.0737	666.0	772.2	32.366	6.84	22.59	466.
40.	.08105	.0857	.0620	690.9	812.5	33.399	6.66	18.44	487.
42.	.09006	.1030	.0546	712.1	847.2	34.246	6.57	16.44	508.
44.	.09836	.1186	.0492	731.2	878.7	34.980	6.51	15.21	526.
46.	.10618	.1331	.0450	749.0	908.3	35.636	6.48	14.37	544.
48.	.11365	.1467	.0416	765.9	936.4	36.235	6.45	13.77	560.
50.	.12085	.1597	.0388	782.2	963.4	36.787	6.43	13.31	575.
55.	.13803	.1899	.0333	820.8	1027.9	38.016	6.41	12.54	609.
60.	.15439	.2178	.0294	857.7	1089.3	39.086	6.41	12.07	640.
65.	.17022	.2443	.0263	893.5	1148.9	40.039	6.43	11.78	669.
70.	.18567	.2698	.0239	928.8	1207.3	40.905	6.47	11.60	695.
75.	.20084	.2945	.0220	963.8	1265.1	41.702	6.54	11.51	720.
80.	.21580	.3186	.0203	998.8	1322.5	42.443	6.62	11.46	743.
90.	.24526	.3655	.0177	1069.3	1437.2	43.796	6.84	11.51	784.
100.	.27427	.4112	.0158	1141.5	1552.9	45.014	7.10	11.65	821.
110.	.30295	.4559	.0142	1216.2	1670.6	46.132	7.40	11.86	855.
120.	.33142	.4999	.0129	1293.2	1790.3	47.175	7.69	12.09	886.
140.	.38790	.5868	.0110	1455.0	2036.9	49.075	8.25	12.56	945.
160.	.44397	.6724	.0095	1626.5	2292.4	50.779	8.72	12.98	1001.
180.	.49977	.7572	.0084	1806.1	2555.8	52.329	9.11	13.34	1053.
200.	.55538	.8415	.0076	1992.4	2825.5	53.751	9.42	13.63	1103.
220.	.61087	.9255	.0069	2184.1	3100.4	55.060	9.67	13.86	1152.
240.	.66627	1.0091	.0063	2380.1	3379.5	56.275	9.86	14.04	1199.
260.	.72159	1.0926	.0058	2579.3	3661.7	57.405	10.00	14.17	1244.
280.	.77685	1.1759	.0054	2780.9	3946.2	58.459	10.11	14.28	1288.
300.	.83206	1.2591	.0050	2984.7	4232.8	59.446	10.19	14.35	1331.
350.	.96994	1.4665	.0043	3498.3	4953.2	61.668	10.31	14.45	1434.
400.	1.10769	1.6735	.0038	4015.4	5677.0	63.601	10.35	14.49	1530.
450.	1.24536	1.8803	.0033	4534.2	6402.2	65.309	10.37	14.51	1622.
500.	1.38297	2.0869	.0030	5053.7	7128.1	66.838	10.39	14.52	1708.
550.	1.52056	2.2934	.0027	5573.7	7854.5	68.223	10.41	14.54	1790.
600.	1.65812	2.4999	.0025	6094.7	8581.9	69.486	10.42	14.55	1868.
650.	1.79566	2.7063	.0023	6616.5	9310.0	70.648	10.45	14.57	1943.
700.	1.93319	2.9127	.0021	7139.9	10039.7	71.736	10.48	14.61	2015.
750.	2.07071	3.1190	.0020	7665.3	10771.3	72.747	10.52	14.65	2084.
800.	2.20822	3.3253	.0019	8192.7	11505.0	73.695	10.57	14.70	2150.
850.	2.34572	3.5316	.0018	8722.9	12241.5	74.587	10.63	14.75	2214.
900.	2.48322	3.7379	.0017	9256.2	12981.0	75.431	10.70	14.82	2276.
950.	2.62072	3.9442	.0016	9792.9	13724.0	76.233	10.77	14.90	2335.
1000.	2.75821	4.1505	.0015	10333.4	14470.7	76.999	10.86	14.98	2393.
1100.	3.03319	4.5630	.0014	11428.9	15978.7	78.425	11.04	15.16	2504.
1200.	3.30816	4.9755	.0013	12543.8	17506.0	79.746	11.24	15.36	2608.
1300.	3.58313	5.3880	.0012	13679.4	19054.1	80.985	11.45	15.58	2707.
1400.	3.85809	5.8004	.0011	14836.5	20623.6	82.155	11.68	15.80	2802.
1500.	4.13306	6.2129	.0010	16015.6	22215.2	83.267	11.90	16.03	2892.
1600.	4.40804	6.6253	.0009	17215.9	23827.9	84.301	12.13	16.25	2980.
1700.	4.68305	7.0378	.0009	18438.9	25463.5	85.288	12.36	16.48	3064.
1800.	4.95814	7.4502	.0008	19686.0	27123.3	86.236	12.60	16.73	3145.
2000.	5.50898	8.2751	.0008	22263.3	30526.8	88.039	13.18	17.33	3298.
2200.	6.06215	9.0999	.0007	24982.6	34075.8	89.722	14.08	18.28	3437.
2400.	6.62127	9.9248	.0006	27941.8	37873.7	91.368	15.56	19.89	3561.
2600.	7.19322	10.7497	.0006	31301.9	42091.7	93.055	17.96	22.54	3671.
2800.	7.78937	11.5745	.0005	35302.4	46986.5	94.872	21.65	26.70	3776.
3000.	8.42675	12.3993	.0005	40263.2	52903.4	96.920	26.94	32.79	3881.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

1.50 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 14.296	77.8506	671.3	.25391	98.6543	.00951	78.62	264.03	.00057	1.25451	2.1435
15.	77.3176	673.7	.24889	94.5343	.00995	84.72	241.40	.00059	1.25264	1.9091
16.	76.5207	661.5	.24110	85.9509	.01089	91.15	214.88	.00060	1.24983	1.6980
17.	75.6762	664.0	.23165	80.1912	.01147	95.50	193.41	.00060	1.24687	1.5425
18.	74.7864	662.0	.22371	74.3219	.01218	98.65	175.72	.00059	1.24375	1.4357
19.	73.8480	657.9	.21687	68.6960	.01295	100.61	160.87	.00058	1.24046	1.3626
20.	72.8612	651.2	.21090	63.2062	.01382	102.39	148.24	.00056	1.23701	1.3034
22.	70.7307	629.8	.20040	52.3925	.01597	105.77	127.73	.00054	1.22959	1.2149
24.	68.3128	597.3	.19089	41.6902	.01895	106.48	111.48	.00050	1.22120	1.1854
26.	65.5158	555.8	.18085	31.4849	.02322	104.91	97.72	.00045	1.21154	1.2021
28.	62.1792	505.8	.16830	22.0382	.02974	101.22	85.42	.00039	1.20009	1.2696
30.	57.9478	441.9	.15217	13.2993	.04227	95.19	73.59	.00032	1.18567	1.4441
32.	51.8031	358.1	.12979	5.7282	.07711	86.47	60.78	.00022	1.16493	1.9409
34.	33.1607	221.1	.07051	.2588	.79145	120.17	37.31	.00007	1.10354	5.4319
36.	17.2459	251.0	.07514	.7044	.13372	48.98	25.44	.00030	1.05294	1.7434
38.	14.1209	284.3	.07625	.9270	.07946	43.72	24.50	.00049	1.04320	1.2660
40.	12.3383	314.5	.07542	1.0570	.05862	42.27	24.54	.00067	1.03768	1.0702
42.	11.1031	344.1	.07494	1.1436	.04777	42.07	24.90	.00083	1.03386	.9727
44.	10.1664	372.6	.07437	1.2062	.04081	42.37	25.40	.00099	1.03097	.9118
46.	9.4180	400.3	.07382	1.2538	.03591	42.94	25.98	.00114	1.02867	.8697
48.	8.7991	427.2	.07330	1.2912	.03223	43.67	26.60	.00130	1.02677	.8387
50.	8.2746	453.6	.07280	1.3213	.02934	44.49	27.25	.00145	1.02516	.8151
55.	7.2447	517.7	.07169	1.3755	.02422	46.75	28.91	.00185	1.02200	.7754
60.	6.4771	580.0	.07071	1.4109	.02081	49.16	30.60	.00226	1.01965	.7510
65.	5.8748	641.9	.06974	1.4355	.01835	51.85	32.26	.00270	1.01781	.7329
70.	5.3859	704.2	.06868	1.4533	.01648	54.38	33.91	.00313	1.01632	.7235
75.	4.9790	767.4	.06753	1.4665	.01499	56.77	35.52	.00357	1.01508	.7199
80.	4.6339	831.9	.06630	1.4766	.01378	59.09	37.11	.00400	1.01403	.7200
90.	4.0774	966.4	.06360	1.4905	.01191	65.37	40.19	.00502	1.01234	.7075
100.	3.6461	1108.0	.06086	1.4992	.01052	71.12	43.16	.00603	1.01103	.7070
110.	3.3008	1257.8	.05808	1.5047	.00943	77.91	45.14	.00716	1.00998	.6872
120.	3.0173	1412.1	.05565	1.5085	.00856	84.32	47.92	.00832	1.00912	.6872
140.	2.5780	1732.9	.05159	1.5126	.00725	97.22	53.26	.01081	1.00779	.6882
160.	2.2524	2061.8	.04857	1.5145	.00630	110.08	58.35	.01355	1.00680	.6882
180.	2.0009	2393.7	.04633	1.5151	.00557	122.64	63.24	.01654	1.00604	.6878
200.	1.8006	2724.9	.04468	1.5152	.00500	134.73	67.95	.01977	1.00544	.6872
220.	1.6370	3054.3	.04344	1.5150	.00454	146.27	72.51	.02321	1.00494	.6870
240.	1.5009	3379.3	.04252	1.5146	.00415	157.27	76.94	.02687	1.00453	.6868
260.	1.3858	3699.8	.04184	1.5141	.00383	167.74	81.25	.03074	1.00418	.6866
280.	1.2872	4015.2	.04134	1.5136	.00356	177.75	85.46	.03482	1.00388	.6863
300.	1.2018	4326.4	.04096	1.5132	.00332	187.33	89.57	.03911	1.00363	.6860
350.	1.0310	5085.8	.04043	1.5119	.00284	209.76	99.47	.05068	1.00311	.6853
400.	.9028	5829.1	.04018	1.5108	.00249	230.53	108.92	.06343	1.00272	.6848
450.	.8030	6563.6	.04006	1.5098	.00221	250.14	118.00	.07730	1.00242	.6844
500.	.7231	7298.9	.03996	1.5090	.00199	268.94	126.75	.09219	1.00218	.6845
550.	.6577	8033.3	.03988	1.5083	.00181	287.19	135.22	.10815	1.00198	.6844
600.	.6031	8771.8	.03979	1.5077	.00166	305.05	143.44	.12512	1.00182	.6843
650.	.5569	9514.6	.03968	1.5071	.00153	322.67	151.45	.14311	1.00168	.6841
700.	.5173	10266.8	.03954	1.5067	.00142	340.14	159.26	.16206	1.00156	.6839
750.	.4829	11027.7	.03938	1.5063	.00133	357.53	166.89	.18196	1.00146	.6837
800.	.4529	11800.0	.03918	1.5059	.00125	374.89	174.37	.20279	1.00137	.6835
850.	.4263	12585.2	.03896	1.5056	.00117	392.27	181.71	.22451	1.00128	.6835
900.	.4027	13384.8	.03870	1.5053	.00111	409.69	188.91	.24709	1.00121	.6835
950.	.3816	14199.5	.03841	1.5050	.00105	427.19	195.99	.27050	1.00115	.6836
1000.	.3626	15030.0	.03811	1.5048	.00100	444.77	202.97	.29473	1.00109	.6838
1100.	.3297	16728.0	.03747	1.5044	.00091	475.56	216.61	.34243	1.00099	.6907
1200.	.3023	18484.7	.03680	1.5040	.00083	511.01	229.88	.39611	1.00091	.6912
1300.	.2791	20299.4	.03610	1.5037	.00077	546.91	242.84	.45288	1.00084	.6917
1400.	.2592	22170.1	.03541	1.5034	.00071	583.24	255.51	.51270	1.00078	.6922
1500.	.2420	24094.4	.03472	1.5032	.00067	620.03	267.91	.57554	1.00073	.6926
1600.	.2269	26056.2	.03408	1.5030	.00062	657.00	280.06	.64148	1.00068	.6928
1700.	.2135	28073.5	.03344	1.5028	.00059	694.83	291.98	.71067	1.00064	.6927
1800.	.2017	30164.1	.03280	1.5026	.00055	734.30	303.68	.78348	1.00061	.6918
2000.	.1815	34715.3	.03134	1.5021	.00050	824.31	326.45	.94314	1.00055	.6865
2200.	.1650	40254.1	.02935	1.5011	.00045	947.78	344.95	1.13127	1.00050	.6654
2400.	.1510	47693.6	.02659	1.4989	.00042	1139.57	366.43	1.36591	1.00046	.6395
2600.	.1390	58392.9	.02310	1.4944	.00039	1450.60	387.70	1.66634	1.00042	.6025
2800.	.1284	74055.2	.01928	1.4859	.00036	1944.40	409.09	2.04221	1.00039	.5617
3000.	.1187	96506.1	.01564	1.4714	.00034	2689.20	431.05	2.48770	1.00036	.5256

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

2.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.457	.01280	1.2994	.9407	219.1	244.7	14.128	4.77	6.38	1319.
15.	.01287	1.2650	.9449	222.5	248.2	14.369	4.88	6.63	1311.
16.	.01300	1.1850	.9435	229.1	255.1	14.811	5.06	7.09	1288.
17.	.01313	1.1096	.9322	236.1	262.4	15.254	5.23	7.53	1264.
18.	.01328	1.0414	.9177	243.6	270.1	15.697	5.39	7.96	1240.
19.	.01345	.9770	.9029	251.4	278.3	16.139	5.54	8.41	1218.
20.	.01362	.9157	.8873	259.7	286.9	16.582	5.67	8.86	1196.
22.	.01401	.7908	.8514	277.6	305.6	17.474	5.89	9.85	1150.
24.	.01447	.6647	.8075	297.5	326.4	18.378	6.05	10.98	1098.
26.	.01504	.5392	.7529	319.6	349.7	19.307	6.16	12.35	1039.
28.	.01575	.4174	.6856	344.5	376.0	20.281	6.26	14.08	969.
30.	.01671	.2994	.6046	373.1	406.5	21.331	6.34	16.57	884.
32.	.01812	.1881	.5085	407.2	443.5	22.523	6.46	20.89	780.
34.	.02062	.0915	.3897	452.1	493.4	24.033	6.67	30.65	649.
36.	.02752	.0300	.2395	525.1	580.1	26.505	7.30	59.51	494.
38.	.04137	.0388	.1415	604.2	687.0	29.401	7.23	40.85	468.
40.	.05206	.0618	.1061	647.8	752.0	31.071	6.91	26.65	488.
42.	.06054	.0824	.0877	678.0	799.0	32.220	6.72	21.09	509.
44.	.06776	.1002	.0762	702.1	837.7	33.119	6.60	18.32	527.
46.	.07446	.1169	.0680	723.6	872.5	33.893	6.55	16.63	545.
48.	.08071	.1323	.0617	743.1	904.6	34.576	6.52	15.51	561.
50.	.08664	.1468	.0567	761.5	934.7	35.192	6.50	14.71	576.
55.	.10050	.1801	.0476	803.8	1004.8	36.529	6.47	13.45	612.
60.	.11345	.2102	.0413	843.3	1070.2	37.668	6.46	12.72	643.
65.	.12584	.2385	.0367	880.9	1132.6	38.665	6.47	12.27	673.
70.	.13784	.2654	.0331	917.5	1193.2	39.565	6.51	11.99	700.
75.	.14956	.2913	.0302	953.6	1252.7	40.386	6.57	11.82	724.
80.	.16106	.3164	.0278	989.4	1311.6	41.146	6.64	11.73	747.
90.	.18360	.3650	.0241	1061.4	1428.6	42.525	6.86	11.70	789.
100.	.20571	.4119	.0214	1134.6	1546.0	43.761	7.12	11.80	826.
110.	.22749	.4575	.0192	1210.1	1665.0	44.893	7.42	11.98	860.
120.	.24906	.5024	.0174	1287.7	1785.9	45.945	7.70	12.19	892.
140.	.29176	.5905	.0147	1450.6	2034.1	47.857	8.25	12.63	951.
160.	.33405	.6770	.0128	1622.7	2290.8	49.570	8.72	13.04	1006.
180.	.37609	.7625	.0113	1802.9	2555.0	51.126	9.11	13.38	1058.
200.	.41794	.8474	.0101	1989.6	2825.5	52.550	9.42	13.66	1108.
220.	.45968	.9317	.0092	2181.7	3101.0	53.863	9.67	13.88	1157.
240.	.50131	1.0157	.0084	2377.9	3380.5	55.079	9.86	14.06	1203.
260.	.54288	1.0995	.0077	2577.3	3663.1	56.211	10.01	14.19	1249.
280.	.58439	1.1830	.0072	2779.2	3948.0	57.266	10.12	14.29	1293.
300.	.62587	1.2665	.0067	2983.2	4234.9	58.255	10.20	14.36	1336.
350.	.72937	1.4743	.0057	3497.1	4955.8	60.478	10.31	14.46	1438.
400.	.83275	1.6815	.0050	4014.5	5680.0	62.412	10.36	14.50	1534.
450.	.93605	1.8885	.0045	4533.5	6405.5	64.121	10.38	14.51	1625.
500.	1.03929	2.0952	.0040	5053.0	7131.6	65.650	10.39	14.53	1711.
550.	1.14251	2.3019	.0036	5573.1	7858.2	67.036	10.41	14.54	1793.
600.	1.24570	2.5084	.0033	6094.2	8585.6	68.298	10.43	14.56	1871.
650.	1.34887	2.7149	.0031	6616.1	9313.9	69.461	10.45	14.58	1946.
700.	1.45203	2.9213	.0029	7139.6	10043.6	70.549	10.48	14.61	2018.
750.	1.55518	3.1277	.0027	7664.9	10775.3	71.560	10.52	14.65	2087.
800.	1.65832	3.3340	.0025	8192.4	11509.1	72.508	10.57	14.70	2153.
850.	1.76146	3.5403	.0024	8722.7	12245.6	73.400	10.63	14.76	2217.
900.	1.86459	3.7466	.0022	9256.0	12985.1	74.244	10.70	14.82	2279.
950.	1.96772	3.9529	.0021	9792.7	13728.1	75.047	10.77	14.90	2339.
1000.	2.07084	4.1592	.0020	10333.2	14474.9	75.812	10.86	14.98	2396.
1100.	2.27709	4.5718	.0018	11428.7	15982.9	77.238	11.04	15.17	2506.
1200.	2.48332	4.9843	.0017	12543.6	17510.3	78.560	11.24	15.36	2610.
1300.	2.68955	5.3968	.0015	13679.3	19058.4	79.798	11.45	15.58	2709.
1400.	2.89578	5.8092	.0014	14836.4	20627.9	80.969	11.68	15.80	2804.
1500.	3.10200	6.2217	.0013	16015.4	22219.4	82.081	11.90	16.03	2894.
1600.	3.30824	6.6342	.0013	17215.6	23832.1	83.114	12.13	16.25	2982.
1700.	3.51449	7.0466	.0012	18438.3	25467.3	84.101	12.35	16.48	3066.
1800.	3.72080	7.4591	.0011	19684.6	27126.2	85.048	12.59	16.72	3147.
2000.	4.13384	8.2840	.0010	22257.2	30524.9	86.849	13.14	17.29	3301.
2200.	4.54839	9.1088	.0009	24961.4	34058.1	88.525	13.97	18.16	3441.
2400.	4.96682	9.9337	.0008	27881.8	37815.5	90.153	15.29	19.59	3567.
2600.	5.39357	10.7585	.0008	31157.5	41944.6	91.805	17.41	21.92	3680.
2800.	5.83606	11.5834	.0007	34955.0	46667.1	93.558	20.63	25.56	3785.
3000.	6.30535	12.4082	.0007	39671.0	52281.7	95.502	25.26	30.87	3890.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

2.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.457	78.1196	688.5	.25262	101.5121	.00927	80.56	267.20	.00058	1.25546	2.1162
15.	77.7130	689.7	.24935	98.3063	.00961	85.23	249.22	.00060	1.25403	1.9386
16.	76.9464	685.5	.24215	91.1801	.01035	91.83	221.79	.00061	1.25133	1.7131
17.	76.1334	682.5	.23391	84.4778	.01104	96.34	199.58	.00060	1.24847	1.5603
18.	75.2732	680.3	.22598	78.3875	.01171	99.65	181.27	.00060	1.24545	1.4487
19.	74.3695	676.5	.21912	72.6572	.01243	101.74	165.95	.00059	1.24229	1.3713
20.	73.4224	671.4	.21311	67.2294	.01320	103.67	152.96	.00057	1.23897	1.3073
22.	71.3823	652.7	.20261	56.4471	.01508	107.38	131.98	.00055	1.23186	1.2101
24.	69.0976	624.6	.19317	45.9266	.01758	108.46	115.43	.00051	1.22392	1.1687
26.	66.4945	588.0	.18367	35.8550	.02100	107.37	101.65	.00047	1.21492	1.1690
28.	63.4743	544.2	.17267	26.4928	.02588	104.38	89.61	.00042	1.20453	1.2090
30.	59.8446	491.1	.15926	17.9155	.03375	99.54	78.48	.00036	1.19212	1.3066
32.	55.2006	426.7	.14259	10.3835	.04897	91.79	67.50	.00029	1.17637	1.5364
34.	48.4961	349.1	.12051	4.4390	.08778	84.92	55.59	.00021	1.15388	2.0064
36.	36.3370	270.5	.09027	1.0885	.22002	80.22	40.96	.00013	1.11384	3.0384
38.	24.1693	270.3	.08099	.9366	.15110	60.35	31.40	.00022	1.07475	2.1252
40.	19.2072	298.3	.07987	1.1871	.08935	51.56	28.51	.00036	1.05909	1.4739
42.	16.5171	327.3	.07909	1.3614	.06444	48.54	27.62	.00050	1.05066	1.2000
44.	14.7578	355.3	.07821	1.4784	.05155	47.47	27.48	.00063	1.04518	1.0602
46.	13.4303	384.1	.07721	1.5698	.04329	47.19	27.66	.00076	1.04106	.9746
48.	12.3903	412.4	.07631	1.6397	.03762	47.35	28.01	.00089	1.03784	.9178
50.	11.5426	440.0	.07551	1.6949	.03344	47.76	28.47	.00101	1.03522	.8772
55.	9.9506	506.8	.07384	1.7917	.02655	49.37	29.85	.00133	1.03031	.8135
60.	8.8146	570.9	.07253	1.8533	.02228	51.38	31.37	.00165	1.02681	.7765
65.	7.9467	634.3	.07135	1.8955	.01935	53.80	32.93	.00199	1.02415	.7512
70.	7.2548	697.8	.07013	1.9256	.01719	56.14	34.50	.00232	1.02203	.7371
75.	6.6864	762.1	.06884	1.9479	.01551	58.29	36.06	.00265	1.02029	.7314
80.	6.2088	827.6	.06750	1.9647	.01417	60.49	37.60	.00299	1.01883	.7290
90.	5.4465	963.6	.06462	1.9877	.01214	66.64	40.61	.00376	1.01651	.7131
100.	4.8612	1106.5	.06173	2.0021	.01066	72.29	43.53	.00454	1.01472	.7106
110.	4.3958	1257.8	.05877	2.0111	.00953	78.64	45.37	.00538	1.01331	.6912
120.	4.0150	1413.2	.05625	2.0171	.00863	84.95	48.11	.00625	1.01215	.6903
140.	3.4275	1735.8	.05205	2.0238	.00728	97.70	53.40	.00812	1.01037	.6904
160.	2.9935	2066.4	.04895	2.0266	.00631	110.46	58.46	.01019	1.00905	.6899
180.	2.6590	2399.7	.04665	2.0275	.00558	122.95	63.33	.01244	1.00803	.6891
200.	2.3927	2732.1	.04496	2.0275	.00500	134.98	68.02	.01487	1.00723	.6883
220.	2.1754	3062.6	.04367	2.0270	.00453	146.48	72.57	.01746	1.00657	.6879
240.	1.9948	3388.6	.04273	2.0262	.00415	157.45	77.00	.02021	1.00602	.6875
260.	1.8420	3709.8	.04203	2.0253	.00383	167.90	81.30	.02312	1.00556	.6872
280.	1.7112	4026.0	.04151	2.0243	.00355	177.89	85.50	.02619	1.00517	.6869
300.	1.5978	4338.1	.04112	2.0236	.00331	187.46	89.61	.02941	1.00482	.6864
350.	1.3710	5098.4	.04056	2.0213	.00284	209.86	99.50	.03811	1.00414	.6856
400.	1.2008	5842.4	.04029	2.0192	.00248	230.61	108.95	.04768	1.00362	.6850
450.	1.0683	6577.4	.04016	2.0175	.00221	250.21	118.02	.05810	1.00322	.6846
500.	.9622	7313.1	.04005	2.0160	.00199	269.00	126.77	.06928	1.00290	.6846
550.	.8753	8047.7	.03996	2.0147	.00181	287.24	135.23	.08126	1.00264	.6845
600.	.8028	8786.4	.03986	2.0136	.00166	305.10	143.46	.09400	1.00242	.6844
650.	.7414	9529.4	.03975	2.0127	.00153	322.72	151.46	.10751	1.00224	.6841
700.	.6887	10281.7	.03960	2.0119	.00142	340.18	159.27	.12172	1.00208	.6840
750.	.6430	11042.7	.03944	2.0111	.00133	357.56	166.91	.13667	1.00194	.6837
800.	.6030	11815.2	.03924	2.0105	.00124	374.92	174.38	.15230	1.00182	.6836
850.	.5677	12600.6	.03901	2.0099	.00117	392.30	181.72	.16859	1.00171	.6835
900.	.5363	13400.2	.03874	2.0094	.00111	409.72	188.92	.18554	1.00162	.6835
950.	.5082	14215.1	.03846	2.0089	.00105	427.22	196.00	.20311	1.00153	.6836
1000.	.4829	15045.8	.03815	2.0085	.00100	444.80	202.97	.22129	1.00146	.6838
1100.	.4392	16744.0	.03751	2.0077	.00091	475.56	216.61	.25706	1.00132	.6908
1200.	.4027	18500.9	.03683	2.0071	.00083	511.01	229.89	.29734	1.00121	.6912
1300.	.3718	20315.8	.03613	2.0066	.00077	546.90	242.85	.33993	1.00112	.6917
1400.	.3453	22186.6	.03543	2.0061	.00071	583.23	255.51	.38481	1.00104	.6922
1500.	.3224	24110.3	.03475	2.0057	.00066	619.98	267.91	.43195	1.00097	.6926
1600.	.3023	26070.0	.03411	2.0053	.00062	656.86	280.06	.48139	1.00091	.6929
1700.	.2845	28082.0	.03348	2.0050	.00059	694.47	291.98	.53323	1.00086	.6928
1800.	.2688	30161.0	.03284	2.0047	.00055	733.48	303.68	.58771	1.00081	.6921
2000.	.2419	34647.6	.03145	2.0039	.00050	820.98	326.45	.70663	1.00073	.6875
2200.	.2199	40001.4	.02960	2.0026	.00045	937.39	344.94	.84527	1.00066	.6682
2400.	.2013	47009.6	.02707	2.0000	.00042	1112.82	366.40	1.01585	1.00061	.6449
2600.	.1854	56851.0	.02384	1.9947	.00039	1391.52	387.60	1.23239	1.00056	.6107
2800.	.1713	71012.3	.02020	1.9848	.00036	1828.96	408.85	1.50361	1.00052	.5713
3000.	.1586	91109.1	.01664	1.9679	.00034	2485.57	430.56	1.82796	1.00048	.5347

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

2.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.615	.01276	1.3311	.9438	219.3	251.2	14.140	4.79	6.38	1332.
15.	.01280	1.3125	.9471	221.7	253.7	14.309	4.87	6.55	1329.
16.	.01293	1.2382	.9495	228.2	260.5	14.745	5.05	7.00	1310.
17.	.01306	1.1575	.9442	235.1	267.7	15.183	5.23	7.46	1285.
18.	.01320	1.0930	.9296	242.4	275.4	15.621	5.38	7.86	1264.
19.	.01336	1.0271	.9152	250.1	283.5	16.058	5.53	8.29	1241.
20.	.01352	.9641	.8999	258.2	292.0	16.495	5.66	8.73	1220.
22.	.01389	.8411	.8655	275.6	310.3	17.371	5.87	9.65	1176.
24.	.01432	.7170	.8236	294.9	330.7	18.255	6.04	10.70	1127.
26.	.01484	.5935	.7725	316.2	353.3	19.157	6.16	11.92	1072.
28.	.01548	.4768	.7109	339.8	378.5	20.091	6.25	13.37	1009.
30.	.01630	.3619	.6386	366.3	407.0	21.075	6.33	15.31	935.
32.	.01740	.2566	.5555	396.7	440.2	22.144	6.42	18.07	850.
34.	.01904	.1628	.4605	432.9	480.5	23.364	6.53	22.59	750.
36.	.02184	.0888	.3529	478.5	533.1	24.867	6.73	30.79	638.
38.	.02724	.0509	.2453	537.2	605.3	26.816	7.05	40.38	540.
40.	.03530	.0523	.1728	595.1	683.4	28.820	7.05	35.51	513.
42.	.04305	.0690	.1338	637.8	745.4	30.336	6.90	27.09	521.
44.	.04977	.0872	.1111	669.8	794.3	31.472	6.76	22.18	535.
46.	.05576	.1048	.0962	696.1	835.5	32.389	6.66	19.28	551.
48.	.06125	.1213	.0855	719.0	872.1	33.168	6.60	17.44	566.
50.	.06631	.1365	.0774	739.6	905.4	33.849	6.57	16.22	581.
55.	.07817	.1721	.0636	786.3	981.7	35.305	6.53	14.44	617.
60.	.08905	.2042	.0544	828.6	1051.2	36.515	6.50	13.39	648.
65.	.09936	.2339	.0478	868.1	1116.5	37.560	6.51	12.78	678.
70.	.10928	.2621	.0428	906.1	1179.3	38.492	6.54	12.39	705.
75.	.11891	.2890	.0389	943.3	1240.6	39.338	6.59	12.14	730.
80.	.12832	.3151	.0357	980.1	1300.9	40.116	6.67	11.99	753.
90.	.14670	.3650	.0308	1053.4	1420.2	41.522	6.87	11.89	795.
100.	.16465	.4131	.0271	1127.6	1539.3	42.776	7.13	11.95	832.
110.	.18228	.4596	.0242	1204.0	1659.7	43.921	7.43	12.10	865.
120.	.19970	.5052	.0220	1282.3	1781.6	44.982	7.72	12.29	897.
140.	.23411	.5944	.0185	1446.1	2031.4	46.907	8.26	12.70	956.
160.	.26813	.6818	.0161	1619.0	2289.3	48.627	8.73	13.09	1011.
180.	.30190	.7680	.0142	1799.7	2554.4	50.188	9.12	13.42	1063.
200.	.33550	.8533	.0127	1986.8	2825.6	51.617	9.43	13.69	1113.
220.	.36897	.9381	.0115	2179.2	3101.6	52.932	9.68	13.91	1161.
240.	.40235	1.0225	.0105	2375.7	3381.6	54.150	9.87	14.08	1208.
260.	.43566	1.1065	.0097	2575.4	3664.6	55.283	10.01	14.21	1253.
280.	.46892	1.1902	.0090	2777.5	3949.8	56.340	10.12	14.31	1297.
300.	.50216	1.2740	.0084	2981.7	4237.1	57.330	10.20	14.37	1340.
350.	.58503	1.4821	.0072	3495.9	4958.5	59.555	10.31	14.47	1442.
400.	.66779	1.6896	.0063	4013.6	5683.0	61.490	10.36	14.51	1538.
450.	.75046	1.8967	.0056	4532.7	6408.9	63.199	10.38	14.52	1629.
500.	.83309	2.1036	.0050	5052.4	7135.1	64.729	10.39	14.53	1715.
550.	.91568	2.3103	.0046	5572.6	7861.8	66.114	10.41	14.54	1797.
600.	.99825	2.5169	.0042	6093.8	8589.4	67.377	10.43	14.56	1875.
650.	1.08080	2.7234	.0038	6615.7	9317.7	68.540	10.45	14.58	1949.
700.	1.16334	2.9299	.0036	7139.2	10047.6	69.628	10.48	14.61	2021.
750.	1.24586	3.1363	.0033	7664.6	10779.3	70.639	10.52	14.65	2090.
800.	1.32839	3.3427	.0031	8192.1	11513.1	71.587	10.57	14.70	2156.
850.	1.41090	3.5490	.0029	8722.4	12249.7	72.479	10.63	14.76	2220.
900.	1.49341	3.7553	.0028	9255.7	12989.3	73.324	10.70	14.82	2281.
950.	1.57592	3.9617	.0026	9792.5	13732.3	74.126	10.77	14.90	2341.
1000.	1.65842	4.1680	.0025	10333.0	14479.1	74.891	10.86	14.99	2398.
1100.	1.82342	4.5805	.0023	11428.6	15987.1	76.318	11.04	15.17	2508.
1200.	1.98841	4.9931	.0021	12543.5	17514.6	77.639	11.24	15.36	2613.
1300.	2.15340	5.4056	.0019	13679.2	19062.7	78.878	11.45	15.58	2712.
1400.	2.31838	5.8180	.0018	14836.3	20632.3	80.048	11.68	15.80	2806.
1500.	2.48337	6.2305	.0017	16015.3	22223.7	81.160	11.90	16.03	2896.
1600.	2.64836	6.6430	.0016	17215.4	23836.3	82.194	12.12	16.25	2984.
1700.	2.81336	7.0554	.0015	18437.9	25471.3	83.181	12.35	16.47	3068.
1800.	2.97840	7.4679	.0014	19683.7	27129.7	84.128	12.58	16.71	3149.
2000.	3.30878	8.2928	.0013	22253.0	30524.9	85.926	13.12	17.26	3303.
2200.	3.64025	9.1177	.0011	24946.8	34047.5	87.597	13.89	18.07	3444.
2400.	3.97448	9.9425	.0010	27840.9	37777.1	89.214	15.10	19.38	3571.
2600.	4.31469	10.7674	.0010	31058.9	41845.6	90.841	17.03	21.50	3686.
2800.	4.66616	11.5922	.0009	34785.1	46450.5	92.551	19.94	24.78	3793.
3000.	5.03682	12.4171	.0008	39266.7	51858.8	94.424	24.11	29.55	3898.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

2.50 MPA ISOBAR

TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 14.615	78.3836	705.3	.25148	104.3378	.00905	82.44	270.30	.00059	1.25639	2.0918
15.	78.1041	708.6	.24920	102.5141	.00924	85.73	257.35	.00060	1.25541	1.9652
16.	77.3614	706.3	.24281	95.7904	.00991	92.50	228.86	.00061	1.25279	1.7322
17.	76.5720	700.2	.23596	88.6329	.01065	97.16	205.81	.00061	1.25001	1.5799
18.	75.7402	700.3	.22800	82.7863	.01123	100.61	186.86	.00061	1.24709	1.4606
19.	74.8684	696.8	.22111	76.9010	.01190	102.84	171.05	.00060	1.24403	1.3792
20.	73.9536	691.6	.21508	71.2964	.01262	104.90	157.65	.00058	1.24083	1.3118
22.	71.9949	675.5	.20462	60.5553	.01429	108.90	136.11	.00056	1.23399	1.2067
24.	69.8221	650.3	.19526	50.0652	.01645	110.32	119.28	.00053	1.22643	1.1566
26.	67.3769	617.1	.18610	39.9903	.01932	109.64	105.41	.00049	1.21796	1.1460
28.	64.5913	579.1	.17599	30.7942	.02309	107.17	93.46	.00045	1.20836	1.1658
30.	61.3589	532.4	.16439	22.2056	.02876	103.15	82.72	.00040	1.19728	1.2278
32.	57.4635	479.7	.15062	14.7479	.03767	96.76	72.58	.00034	1.18402	1.3553
34.	52.5200	419.4	.13426	8.5493	.05386	89.18	62.51	.00027	1.16734	1.5834
36.	45.7965	355.0	.11454	4.0682	.08675	83.06	52.11	.00021	1.14490	1.9318
38.	36.7123	307.6	.09479	1.8688	.13127	75.30	42.00	.00018	1.11506	2.2523
40.	28.3274	304.4	.08646	1.4810	.11665	64.70	35.39	.00023	1.08800	1.9426
42.	23.2312	324.5	.08350	1.6025	.08349	57.50	32.25	.00033	1.07177	1.5194
44.	20.0928	349.8	.08183	1.7516	.06342	54.03	30.78	.00044	1.06187	1.2638
46.	17.9350	376.8	.08048	1.8787	.05118	52.38	30.17	.00055	1.05510	1.1106
48.	16.3274	404.2	.07928	1.9804	.04315	51.67	30.01	.00065	1.05007	1.0132
50.	15.0802	431.2	.07819	2.0578	.03762	51.52	30.14	.00076	1.04618	.9491
55.	12.7933	499.6	.07617	2.2020	.02890	52.26	31.02	.00102	1.03908	.8570
60.	11.2294	564.7	.07446	2.2926	.02372	53.76	32.28	.00129	1.03425	.8042
65.	10.0642	629.1	.07303	2.3545	.02031	55.87	33.69	.00156	1.03066	.7703
70.	9.1511	693.6	.07162	2.3985	.01786	57.97	35.15	.00184	1.02795	.7511
75.	8.4099	758.7	.07019	2.4308	.01600	59.86	36.63	.00211	1.02557	.7430
80.	7.7927	824.9	.06872	2.4551	.01454	61.94	38.12	.00239	1.02368	.7380
90.	6.8166	962.1	.06565	2.4883	.01236	67.94	41.05	.00302	1.02069	.7185
100.	6.0735	1106.0	.06261	2.5089	.01080	73.47	43.91	.00365	1.01842	.7140
110.	5.4862	1258.9	.05946	2.5216	.00961	79.44	45.62	.00431	1.01663	.6949
120.	5.0075	1415.1	.05685	2.5300	.00868	85.64	48.32	.00501	1.01517	.6932
140.	4.2715	1739.4	.05252	2.5391	.00730	98.22	53.55	.00652	1.01293	.6924
160.	3.7295	2071.4	.04932	2.5428	.00632	110.86	58.58	.00818	1.01128	.6915
180.	3.3124	2406.1	.04697	2.5438	.00558	123.27	63.42	.00998	1.01002	.6904
200.	2.9807	2739.7	.04522	2.5435	.00500	135.24	68.11	.01193	1.00901	.6894
220.	2.7103	3071.2	.04391	2.5425	.00453	146.70	72.65	.01401	1.00819	.6888
240.	2.4854	3398.0	.04294	2.5412	.00414	157.64	77.06	.01622	1.00751	.6883
260.	2.2954	3720.0	.04221	2.5397	.00382	168.07	81.36	.01855	1.00693	.6878
280.	2.1326	4036.9	.04168	2.5382	.00354	178.03	85.55	.02101	1.00644	.6874
300.	1.9914	4349.8	.04127	2.5371	.00330	187.58	89.65	.02359	1.00601	.6869
350.	1.7093	5111.2	.04069	2.5333	.00283	209.96	99.54	.03056	1.00516	.6859
400.	1.4975	5855.8	.04040	2.5301	.00248	230.70	108.98	.03823	1.00452	.6852
450.	1.3325	6591.2	.04026	2.5274	.00220	250.28	118.04	.04658	1.00402	.6847
500.	1.2004	7327.2	.04013	2.5250	.00198	269.06	126.79	.05553	1.00362	.6847
550.	1.0921	8062.1	.04004	2.5230	.00180	287.29	135.25	.06513	1.00329	.6846
600.	1.0018	8801.0	.03993	2.5213	.00165	305.15	143.47	.07533	1.00302	.6845
650.	.9252	9544.2	.03982	2.5198	.00153	322.76	151.48	.08614	1.00279	.6842
700.	.8596	10296.7	.03966	2.5185	.00142	340.22	159.28	.09753	1.00259	.6840
750.	.8027	11057.8	.03949	2.5174	.00132	357.60	166.92	.10949	1.00242	.6838
800.	.7528	11830.4	.03929	2.5163	.00124	374.96	174.39	.12200	1.00227	.6836
850.	.7088	12615.9	.03905	2.5154	.00117	392.33	181.73	.13504	1.00214	.6835
900.	.6696	13415.7	.03879	2.5146	.00110	409.75	188.93	.14861	1.00202	.6835
950.	.6346	14230.7	.03850	2.5139	.00105	427.24	196.01	.16267	1.00191	.6836
1000.	.6030	15061.5	.03819	2.5132	.00099	444.82	202.98	.17722	1.00182	.6838
1100.	.5484	16760.0	.03754	2.5121	.00090	475.56	216.62	.20584	1.00165	.6908
1200.	.5029	18517.1	.03686	2.5111	.00083	511.01	229.90	.23807	1.00152	.6912
1300.	.4644	20332.3	.03616	2.5102	.00077	546.90	242.85	.27216	1.00140	.6917
1400.	.4313	22203.1	.03546	2.5095	.00071	583.22	255.52	.30807	1.00130	.6922
1500.	.4027	24126.5	.03477	2.5089	.00066	619.95	267.92	.34579	1.00121	.6927
1600.	.3776	26084.9	.03413	2.5083	.00062	656.77	280.07	.38534	1.00114	.6929
1700.	.3554	28093.3	.03351	2.5078	.00059	694.23	291.99	.42679	1.00107	.6929
1800.	.3358	30164.5	.03288	2.5074	.00055	732.93	303.68	.47031	1.00101	.6923
2000.	.3022	34607.2	.03153	2.5063	.00050	818.72	326.45	.56500	1.00091	.6882
2200.	.2747	39834.9	.02978	2.5047	.00045	930.29	344.93	.67456	1.00083	.6701
2400.	.2516	46548.8	.02741	2.5016	.00042	1094.55	366.37	.80797	1.00076	.6488
2600.	.2318	55804.0	.02437	2.4955	.00039	1351.15	387.53	.97607	1.00070	.6167
2800.	.2143	68937.4	.02089	2.4843	.00036	1749.98	408.68	1.18649	1.00065	.5786
3000.	.1985	87415.3	.01741	2.4653	.00034	2345.90	430.21	1.43955	1.00060	.5419

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

3.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.772	.01272	1.3623	.9470	219.6	257.8	14.151	4.81	6.38	1345.
15.	.01274	1.3585	.9492	221.0	259.2	14.250	4.86	6.47	1345.
16.	.01286	1.2794	.9544	227.4	266.0	14.684	5.05	6.93	1326.
17.	.01299	1.2075	.9510	234.1	273.1	15.116	5.22	7.37	1306.
18.	.01313	1.1408	.9404	241.3	280.7	15.549	5.37	7.78	1285.
19.	.01327	1.0731	.9266	248.8	288.6	15.980	5.52	8.20	1262.
20.	.01343	1.0093	.9118	256.8	297.0	16.411	5.65	8.62	1241.
22.	.01378	.8875	.8787	273.8	315.1	17.275	5.86	9.50	1199.
24.	.01419	.7655	.8386	292.5	335.1	18.142	6.03	10.47	1153.
26.	.01467	.6461	.7904	313.1	357.1	19.019	6.16	11.57	1102.
28.	.01525	.5315	.7331	335.7	381.4	19.921	6.25	12.84	1044.
30.	.01597	.4222	.6670	360.7	408.6	20.859	6.33	14.39	980.
32.	.01689	.3184	.5926	388.7	439.4	21.850	6.40	16.47	905.
34.	.01815	.2258	.5101	420.6	475.0	22.931	6.48	19.38	822.
36.	.01997	.1498	.4207	457.8	517.7	24.149	6.59	23.55	732.
38.	.02281	.0967	.3293	501.7	570.1	25.565	6.74	28.92	644.
40.	.02717	.0718	.2490	550.7	632.2	27.157	6.91	32.43	580.
42.	.03273	.0711	.1916	597.0	695.2	28.693	6.91	30.15	557.
44.	.03841	.0830	.1546	635.6	750.9	29.990	6.84	25.55	557.
46.	.04369	.0984	.1306	667.1	798.1	31.041	6.76	21.97	566.
48.	.04856	.1144	.1138	693.8	839.5	31.921	6.69	19.52	578.
50.	.05311	.1299	.1015	717.4	876.7	32.682	6.64	17.83	590.
55.	.06348	.1663	.0812	768.5	958.9	34.251	6.59	15.36	623.
60.	.07295	.1998	.0686	813.7	1032.5	35.534	6.55	14.08	655.
65.	.08185	.2307	.0598	855.2	1100.8	36.626	6.54	13.28	684.
70.	.09035	.2599	.0532	894.8	1165.9	37.591	6.56	12.78	711.
75.	.09858	.2877	.0480	933.1	1228.9	38.460	6.61	12.46	736.
80.	.10659	.3145	.0439	970.9	1290.6	39.258	6.69	12.25	759.
90.	.12217	.3658	.0376	1045.6	1412.1	40.689	6.89	12.08	801.
100.	.13733	.4149	.0330	1120.8	1532.8	41.960	7.14	12.09	838.
110.	.15218	.4622	.0294	1198.1	1654.6	43.118	7.44	12.22	871.
120.	.16683	.5085	.0266	1277.0	1777.5	44.188	7.73	12.38	902.
140.	.19571	.5987	.0224	1441.8	2028.9	46.125	8.27	12.77	961.
160.	.22421	.6868	.0194	1615.3	2287.9	47.853	8.74	13.13	1016.
180.	.25246	.7736	.0171	1796.5	2553.9	49.419	9.13	13.46	1068.
200.	.28054	.8595	.0153	1984.1	2825.7	50.851	9.43	13.72	1118.
220.	.30851	.9446	.0139	2176.8	3102.3	52.169	9.68	13.93	1166.
240.	.33638	1.0293	.0127	2373.6	3382.7	53.390	9.87	14.10	1213.
260.	.36419	1.1135	.0117	2573.5	3666.1	54.524	10.02	14.23	1258.
280.	.39195	1.1975	.0108	2775.8	3951.6	55.582	10.12	14.32	1301.
300.	.41969	1.2816	.0101	2980.3	4239.3	56.573	10.20	14.38	1344.
350.	.48881	1.4900	.0086	3494.8	4961.2	58.800	10.31	14.48	1446.
400.	.55781	1.6977	.0075	4012.7	5686.1	60.736	10.36	14.51	1542.
450.	.62674	1.9049	.0067	4532.0	6412.2	62.445	10.38	14.52	1633.
500.	.69561	2.1119	.0060	5051.8	7138.6	63.975	10.40	14.53	1718.
550.	.76446	2.3187	.0055	5572.1	7865.5	65.362	10.41	14.54	1800.
600.	.83328	2.5254	.0050	6093.4	8593.2	66.625	10.43	14.56	1878.
650.	.90208	2.7320	.0046	6615.3	9321.6	67.787	10.45	14.58	1952.
700.	.97087	2.9385	.0043	7138.9	10051.5	68.876	10.48	14.61	2024.
750.	1.03965	3.1449	.0040	7664.4	10783.3	69.887	10.52	14.65	2093.
800.	1.10842	3.3513	.0038	8191.9	11517.2	70.835	10.57	14.70	2159.
850.	1.17719	3.5577	.0035	8722.2	12253.8	71.727	10.63	14.76	2222.
900.	1.24595	3.7640	.0033	9255.5	12993.4	72.572	10.70	14.82	2284.
950.	1.31471	3.9704	.0032	9792.3	13736.5	73.374	10.77	14.90	2343.
1000.	1.38347	4.1767	.0030	10332.9	14483.3	74.139	10.86	14.99	2401.
1100.	1.52097	4.5893	.0027	11428.5	15991.4	75.566	11.04	15.17	2511.
1200.	1.65847	5.0018	.0025	12543.4	17518.8	76.887	11.24	15.36	2615.
1300.	1.79596	5.4143	.0023	13679.1	19067.0	78.126	11.45	15.58	2714.
1400.	1.93345	5.8268	.0021	14836.2	20636.6	79.296	11.68	15.80	2808.
1500.	2.07094	6.2393	.0020	16015.2	22228.0	80.408	11.90	16.03	2899.
1600.	2.20843	6.6518	.0019	17215.2	23840.5	81.442	12.12	16.25	2986.
1700.	2.34593	7.0643	.0018	18437.6	25475.4	82.428	12.35	16.47	3070.
1800.	2.48346	7.4767	.0017	19682.9	27133.3	83.375	12.57	16.70	3151.
2000.	2.75875	8.3016	.0015	22249.8	30526.1	85.173	13.10	17.24	3305.
2200.	3.03487	9.1265	.0014	24936.1	34040.7	86.839	13.83	18.01	3447.
2400.	3.31309	9.9514	.0013	27810.7	37750.0	88.447	14.97	19.23	3575.
2600.	3.59585	10.7762	.0012	30986.1	41773.7	90.057	16.75	21.19	3692.
2800.	3.88719	11.6011	.0011	34630.3	46291.8	91.735	19.43	24.20	3799.
3000.	4.19314	12.4259	.0010	38968.3	51547.7	93.555	23.26	28.58	3904.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

3.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.772	78.6428	721.9	.25043	107.1338	.00884	84.28	273.40	.00060	1.25731	2.0700
15.	78.4822	726.8	.24911	106.6179	.00890	86.21	265.60	.00061	1.25674	1.9933
16.	77.7515	722.4	.24323	99.4716	.00959	93.13	235.84	.00062	1.25416	1.7550
17.	76.9926	720.1	.23670	92.9694	.01023	97.95	212.07	.00062	1.25149	1.5949
18.	76.1868	718.9	.22967	86.9158	.01082	101.54	192.47	.00062	1.24866	1.4744
19.	75.3438	715.1	.22288	80.8495	.01146	103.90	176.15	.00061	1.24570	1.3895
20.	74.4611	710.3	.21687	75.1511	.01213	106.09	162.34	.00060	1.24261	1.3188
22.	72.5731	696.3	.20646	64.4117	.01364	110.36	140.21	.00058	1.23601	1.2066
24.	70.4955	673.7	.19717	53.9663	.01554	112.08	123.04	.00055	1.22877	1.1492
26.	68.1839	644.6	.18824	44.0539	.01794	111.75	109.03	.00051	1.22075	1.1284
28.	65.5849	610.4	.17873	34.8590	.02103	109.72	97.09	.00047	1.21178	1.1361
30.	62.6303	570.4	.16832	26.4435	.02523	106.28	86.54	.00042	1.20163	1.1716
32.	59.2057	523.9	.15637	18.8488	.03144	100.77	76.87	.00037	1.18994	1.2564
34.	55.1099	472.8	.14282	12.4434	.04099	94.04	67.64	.00032	1.17606	1.3940
36.	50.0718	420.0	.12756	7.5024	.05608	87.77	58.66	.00027	1.15913	1.5739
38.	43.8311	372.3	.11138	4.2386	.07769	81.47	50.05	.00023	1.13840	1.7769
40.	36.8045	343.9	.09794	2.6409	.09429	74.36	42.76	.00022	1.11536	1.8647
42.	30.5512	341.7	.09069	2.1711	.08823	67.11	37.90	.00026	1.09513	1.7025
44.	26.0341	356.9	.08678	2.1601	.07158	61.70	35.12	.00033	1.08067	1.4544
46.	22.8887	378.9	.08442	2.2517	.05799	58.48	33.56	.00042	1.07069	1.2608
48.	20.5912	403.7	.08265	2.3549	.04834	56.70	32.72	.00051	1.06344	1.1262
50.	18.8289	429.5	.08118	2.4449	.04152	55.78	32.34	.00060	1.05790	1.0339
55.	15.7532	495.9	.07824	2.6199	.03098	55.39	32.48	.00082	1.04828	.9008
60.	13.7071	561.7	.07648	2.7380	.02507	56.31	33.36	.00105	1.04192	.8341
65.	12.2174	626.5	.07478	2.8188	.02120	58.04	34.55	.00129	1.03730	.7905
70.	11.0676	691.4	.07317	2.8764	.01848	59.89	35.87	.00152	1.03375	.7654
75.	10.1443	757.0	.07157	2.9187	.01645	61.49	37.26	.00175	1.03090	.7547
80.	9.3815	823.7	.06997	2.9505	.01487	63.44	38.67	.00199	1.02856	.7469
90.	8.1851	961.9	.06669	2.9939	.01256	69.27	41.51	.00252	1.02488	.7238
100.	7.2815	1106.6	.06350	3.0208	.01092	74.68	44.31	.00305	1.02211	.7173
110.	6.5711	1260.8	.06016	3.0369	.00969	80.30	45.92	.00360	1.01994	.6985
120.	5.9941	1417.8	.05745	3.0477	.00873	86.38	48.56	.00419	1.01818	.6960
140.	5.1097	1743.6	.05299	3.0591	.00732	98.78	53.73	.00545	1.01548	.6944
160.	4.4602	2076.9	.04970	3.0635	.00632	111.29	58.72	.00684	1.01350	.6930
180.	3.9610	2412.8	.04728	3.0643	.00558	123.61	63.54	.00835	1.01199	.6916
200.	3.5645	2747.5	.04549	3.0635	.00499	135.52	68.20	.00998	1.01078	.6904
220.	3.2414	3080.0	.04414	3.0618	.00452	146.94	72.72	.01171	1.00980	.6897
240.	2.9728	3407.7	.04314	3.0598	.00414	157.83	77.13	.01356	1.00899	.6890
260.	2.7458	3730.4	.04240	3.0575	.00381	168.24	81.42	.01550	1.00830	.6885
280.	2.5514	4047.9	.04184	3.0552	.00354	178.18	85.60	.01756	1.00771	.6880
300.	2.3827	4361.7	.04142	3.0536	.00330	187.72	89.70	.01972	1.00720	.6873
350.	2.0458	5124.0	.04081	3.0481	.00283	210.07	99.58	.02554	1.00618	.6862
400.	1.7927	5869.3	.04051	3.0434	.00247	230.78	109.01	.03194	1.00541	.6854
450.	1.5956	6605.1	.04036	3.0394	.00220	250.35	118.07	.03890	1.00482	.6849
500.	1.4376	7341.4	.04022	3.0360	.00198	269.12	126.81	.04637	1.00434	.6849
550.	1.3081	8076.5	.04012	3.0331	.00180	287.35	135.27	.05437	1.00395	.6847
600.	1.2001	8815.6	.04000	3.0307	.00165	305.20	143.49	.06288	1.00362	.6845
650.	1.1085	9559.0	.03988	3.0285	.00153	322.80	151.49	.07190	1.00334	.6842
700.	1.0300	10311.6	.03973	3.0266	.00142	340.26	159.30	.08139	1.00311	.6841
750.	.9619	11072.9	.03955	3.0250	.00132	357.64	166.93	.09137	1.00290	.6838
800.	.9022	11845.6	.03934	3.0235	.00124	374.99	174.41	.10180	1.00272	.6836
850.	.8495	12631.2	.03910	3.0222	.00117	392.36	181.74	.11268	1.00256	.6835
900.	.8026	13431.2	.03884	3.0210	.00110	409.78	188.94	.12399	1.00242	.6835
950.	.7606	14246.3	.03854	3.0199	.00105	427.27	196.02	.13571	1.00229	.6836
1000.	.7228	15077.2	.03823	3.0190	.00099	444.85	202.99	.14784	1.00218	.6838
1100.	.6575	16775.9	.03758	3.0173	.00090	475.56	216.63	.17170	1.00198	.6908
1200.	.6030	18533.4	.03689	3.0159	.00083	511.01	229.90	.19857	1.00182	.6913
1300.	.5568	20348.8	.03619	3.0147	.00077	546.90	242.86	.22698	1.00168	.6918
1400.	.5172	22219.7	.03549	3.0137	.00071	583.21	255.52	.25692	1.00156	.6923
1500.	.4829	24142.9	.03480	3.0128	.00066	619.92	267.92	.28836	1.00146	.6927
1600.	.4528	26100.4	.03416	3.0120	.00062	656.69	280.07	.32132	1.00136	.6930
1700.	.4263	28106.3	.03354	3.0113	.00059	694.05	291.99	.35585	1.00128	.6930
1800.	.4027	30171.7	.03292	3.0106	.00055	732.51	303.69	.39207	1.00121	.6925
2000.	.3625	34582.2	.03160	3.0092	.00050	817.04	326.45	.47072	1.00109	.6888
2200.	.3295	39716.9	.02992	3.0072	.00045	925.05	344.92	.56117	1.00099	.6715
2400.	.3018	46213.6	.02767	3.0036	.00042	1081.07	366.35	.67043	1.00091	.6517
2600.	.2781	55035.9	.02478	2.9968	.00039	1321.32	387.48	.80720	1.00084	.6214
2800.	.2573	67408.8	.02144	2.9844	.00036	1691.58	408.56	.97817	1.00078	.5845
3000.	.2385	84685.3	.01803	2.9634	.00034	2242.45	429.96	1.18453	1.00072	.5479

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

3.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 14.927	.01267	1.3929	.9496	219.9	264.3	14.163	4.83	6.38	1357.
15.	.01268	1.3951	.9505	220.4	264.8	14.194	4.84	6.41	1358.
16.	.01280	1.3237	.9576	226.6	271.4	14.623	5.04	6.85	1342.
17.	.01292	1.2538	.9572	233.2	278.5	15.051	5.21	7.28	1324.
18.	.01305	1.1850	.9506	240.3	286.0	15.479	5.37	7.71	1304.
19.	.01319	1.1224	.9370	247.7	293.9	15.906	5.51	8.10	1284.
20.	.01334	1.0577	.9228	255.5	302.2	16.332	5.64	8.50	1263.
22.	.01368	.9357	.8908	272.1	320.0	17.184	5.86	9.35	1222.
24.	.01406	.8161	.8525	290.4	339.6	18.035	6.03	10.25	1178.
26.	.01451	.6973	.8068	310.3	361.1	18.893	6.16	11.26	1130.
28.	.01504	.5828	.7530	332.1	384.7	19.768	6.26	12.42	1076.
30.	.01569	.4773	.6917	355.9	410.9	20.669	6.33	13.73	1017.
32.	.01649	.3763	.6236	382.2	439.9	21.606	6.40	15.39	951.
34.	.01752	.2847	.5494	411.4	472.7	22.600	6.46	17.53	879.
36.	.01891	.2077	.4703	444.2	510.4	23.676	6.53	20.24	802.
38.	.02084	.1481	.3899	481.2	554.1	24.858	6.62	23.56	726.
40.	.02356	.1099	.3140	522.1	604.5	26.151	6.73	26.64	660.
42.	.02717	.0926	.2509	564.4	659.5	27.491	6.81	27.89	616.
44.	.03140	.0917	.2035	604.3	714.2	28.763	6.82	26.41	596.
46.	.03578	.1007	.1699	638.6	763.8	29.866	6.80	23.69	592.
48.	.04000	.1135	.1462	668.6	808.6	30.819	6.75	21.20	597.
50.	.04401	.1278	.1288	694.9	848.9	31.643	6.70	19.27	606.
55.	.05322	.1633	.1007	750.8	937.0	33.325	6.63	16.31	634.
60.	.06159	.1970	.0838	798.8	1014.4	34.674	6.58	14.71	663.
65.	.06947	.2289	.0725	842.4	1085.6	35.812	6.58	13.77	692.
70.	.07695	.2588	.0640	883.5	1152.8	36.809	6.59	13.16	719.
75.	.08415	.2874	.0576	923.0	1217.6	37.703	6.64	12.76	743.
80.	.09115	.3148	.0524	961.7	1280.7	38.518	6.70	12.50	766.
90.	.10472	.3672	.0447	1037.8	1404.3	39.975	6.90	12.26	808.
100.	.11788	.4172	.0390	1114.0	1526.6	41.262	7.15	12.23	845.
110.	.13073	.4651	.0347	1192.2	1649.7	42.433	7.46	12.33	877.
120.	.14339	.5120	.0313	1271.8	1773.6	43.512	7.74	12.47	908.
140.	.16830	.6032	.0263	1437.5	2026.5	45.461	8.28	12.83	967.
160.	.19285	.6921	.0227	1611.7	2286.6	47.196	8.75	13.18	1021.
180.	.21716	.7794	.0200	1793.4	2553.4	48.767	9.13	13.49	1073.
200.	.24130	.8657	.0179	1981.4	2825.9	50.203	9.44	13.75	1123.
220.	.26533	.9512	.0162	2174.4	3103.1	51.523	9.69	13.96	1171.
240.	.28927	1.0361	.0148	2371.5	3383.9	52.745	9.88	14.12	1217.
260.	.31314	1.1206	.0136	2571.6	3667.6	53.881	10.02	14.24	1262.
280.	.33697	1.2048	.0126	2774.1	3953.5	54.940	10.13	14.33	1306.
300.	.36079	1.2892	.0118	2978.8	4241.6	55.933	10.21	14.40	1349.
350.	.42009	1.4979	.0101	3493.7	4964.0	58.161	10.32	14.48	1450.
400.	.47926	1.7058	.0088	4011.8	5689.2	60.098	10.36	14.52	1546.
450.	.53837	1.9132	.0078	4531.2	6415.5	61.808	10.38	14.53	1636.
500.	.59742	2.1203	.0070	5051.2	7142.2	63.338	10.40	14.54	1722.
550.	.65644	2.3272	.0064	5571.6	7869.1	64.725	10.41	14.55	1803.
600.	.71544	2.5339	.0058	6092.9	8597.0	65.988	10.43	14.56	1881.
650.	.77442	2.7405	.0054	6615.0	9325.5	67.151	10.45	14.58	1956.
700.	.83339	2.9470	.0050	7138.6	10055.4	68.240	10.48	14.61	2027.
750.	.89235	3.1535	.0047	7664.1	10787.3	69.251	10.52	14.65	2095.
800.	.95131	3.3600	.0044	8191.6	11521.2	70.199	10.57	14.70	2162.
850.	1.01025	3.5663	.0041	8722.0	12257.9	71.091	10.63	14.76	2225.
900.	1.06920	3.7727	.0039	9255.3	12997.5	71.936	10.70	14.83	2287.
950.	1.12814	3.9791	.0037	9792.1	13740.6	72.738	10.77	14.90	2346.
1000.	1.18707	4.1854	.0035	10332.7	14487.5	73.503	10.86	14.99	2403.
1100.	1.30494	4.5980	.0032	11428.3	15995.6	74.930	11.04	15.17	2513.
1200.	1.42280	5.0106	.0029	12543.3	17523.1	76.251	11.24	15.37	2617.
1300.	1.54065	5.4231	.0027	13679.0	19071.2	77.490	11.45	15.58	2716.
1400.	1.65850	5.8356	.0025	14836.1	20640.9	78.660	11.68	15.80	2810.
1500.	1.77635	6.2481	.0023	16015.1	22232.3	79.772	11.90	16.03	2901.
1600.	1.89420	6.6606	.0022	17215.1	23844.8	80.806	12.12	16.25	2988.
1700.	2.01206	7.0730	.0021	18437.3	25479.5	81.793	12.34	16.47	3072.
1800.	2.12994	7.4855	.0019	19682.4	27137.2	82.739	12.57	16.70	3153.
2000.	2.36588	8.3104	.0018	22247.4	30528.0	84.536	13.08	17.22	3308.
2200.	2.60248	9.1353	.0016	24927.8	34036.5	86.199	13.79	17.96	3450.
2400.	2.84075	9.9601	.0015	27787.3	37729.9	87.800	14.86	19.12	3579.
2600.	3.08263	10.7850	.0013	30929.6	41718.8	89.396	16.53	20.95	3696.
2800.	3.33131	11.6099	.0012	34509.9	46169.5	91.049	19.03	23.75	3805.
3000.	3.59160	12.4347	.0012	38736.3	51306.9	92.829	22.59	27.82	3910.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

3.50 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 14.927	78.8975	738.4	.24927	109.8930	.00864	86.07	276.50	.00062	1.25820	2.0499
15.	78.8440	741.3	.24890	109.9949	.00864	86.68	273.88	.00062	1.25802	2.0242
16.	78.1394	740.2	.24329	103.4356	.00926	93.76	243.10	.00063	1.25553	1.7767
17.	77.3997	738.6	.23732	97.0466	.00986	98.72	218.42	.00063	1.25292	1.6118
18.	76.6149	736.0	.23117	90.7901	.01047	102.43	198.10	.00062	1.25016	1.4903
19.	75.7943	735.1	.22439	85.0704	.01101	104.90	181.21	.00062	1.24728	1.3986
20.	74.9428	730.5	.21842	79.2684	.01164	107.23	167.01	.00061	1.24429	1.3246
22.	73.1206	717.8	.20806	68.4215	.01302	111.76	144.27	.00059	1.23792	1.2063
24.	71.1269	697.9	.19890	58.0441	.01469	113.75	126.73	.00056	1.23097	1.1421
26.	68.9286	671.0	.19016	48.0622	.01679	113.73	112.54	.00053	1.22333	1.1146
28.	66.4831	639.0	.18105	38.7445	.01944	112.07	100.56	.00049	1.21488	1.1145
30.	63.7444	604.0	.17143	30.4265	.02273	109.09	90.10	.00045	1.20545	1.1339
32.	60.6468	563.1	.16077	22.8203	.02733	104.20	80.69	.00040	1.19485	1.1916
34.	57.0738	518.4	.14900	16.2475	.03382	98.38	71.93	.00035	1.18270	1.2816
36.	52.8898	472.7	.13611	10.9834	.04282	91.90	63.65	.00031	1.16858	1.4021
38.	47.9855	429.5	.12265	7.1055	.05487	86.48	55.87	.00028	1.15217	1.5224
40.	42.4430	395.9	.11001	4.6658	.06730	80.54	48.93	.00026	1.13382	1.6188
42.	36.8054	378.8	.10013	3.4086	.07362	74.54	43.44	.00026	1.11536	1.6255
44.	31.8437	379.1	.09373	2.9211	.06968	69.08	39.67	.00030	1.09929	1.5168
46.	27.9523	392.2	.08944	2.8134	.06040	64.91	37.31	.00035	1.08680	1.3615
48.	25.0017	411.6	.08668	2.8385	.05150	62.14	35.85	.00042	1.07739	1.2231
50.	22.7238	434.4	.08461	2.9033	.04437	60.42	34.97	.00050	1.07017	1.1154
55.	18.7917	496.9	.08085	3.0693	.03282	58.78	34.25	.00069	1.05778	.9501
60.	16.2361	561.1	.07843	3.1993	.02621	59.00	34.64	.00089	1.04979	.8634
65.	14.3943	626.2	.07655	3.2950	.02199	60.32	35.54	.00110	1.04405	.8112
70.	12.9961	691.2	.07475	3.3640	.01904	61.87	36.68	.00130	1.03971	.7802
75.	11.8836	757.1	.07299	3.4150	.01686	63.18	37.95	.00150	1.03627	.7665
80.	10.9709	824.0	.07125	3.4537	.01517	64.97	39.27	.00171	1.03345	.7558
90.	9.5497	962.8	.06775	3.5064	.01273	70.63	41.99	.00217	1.02907	.7290
100.	8.4835	1108.1	.06439	3.5390	.01103	75.89	44.72	.00263	1.02580	.7204
110.	7.6496	1263.6	.06085	3.5582	.00976	81.22	46.24	.00310	1.02324	.7019
120.	6.9740	1421.3	.05804	3.5710	.00877	87.17	48.83	.00361	1.02117	.6986
140.	5.9417	1748.3	.05345	3.5842	.00734	99.37	53.92	.00469	1.01802	.6962
160.	5.1854	2082.9	.05008	3.5888	.00633	111.75	58.87	.00588	1.01571	.6945
180.	4.6050	2419.9	.04759	3.5892	.00558	123.97	63.66	.00718	1.01394	.6928
200.	4.1442	2755.6	.04576	3.5876	.00499	135.81	68.30	.00858	1.01254	.6914
220.	3.7689	3089.0	.04438	3.5850	.00452	147.18	72.81	.01007	1.01140	.6905
240.	3.4570	3417.5	.04335	3.5819	.00413	158.04	77.20	.01166	1.01045	.6897
260.	3.1934	3741.0	.04258	3.5787	.00381	168.41	81.48	.01333	1.00965	.6891
280.	2.9676	4059.1	.04201	3.5754	.00353	178.34	85.66	.01509	1.00897	.6885
300.	2.7717	4373.8	.04158	3.5733	.00329	187.86	89.75	.01695	1.00838	.6878
350.	2.3805	5136.9	.04094	3.5657	.00282	210.17	99.62	.02194	1.00719	.6865
400.	2.0865	5882.8	.04062	3.5592	.00247	230.87	109.04	.02744	1.00630	.6857
450.	1.8575	6619.0	.04045	3.5537	.00219	250.42	118.10	.03341	1.00561	.6851
500.	1.6739	7355.7	.04031	3.5490	.00198	269.19	126.84	.03982	1.00505	.6850
550.	1.5234	8091.0	.04019	3.5451	.00180	287.40	135.30	.04669	1.00460	.6848
600.	1.3977	8830.3	.04007	3.5417	.00165	305.24	143.51	.05399	1.00422	.6846
650.	1.2913	9573.8	.03995	3.5388	.00152	322.84	151.51	.06173	1.00390	.6843
700.	1.1999	10326.6	.03979	3.5362	.00142	340.30	159.31	.06987	1.00362	.6841
750.	1.1206	11088.0	.03960	3.5339	.00132	357.67	166.95	.07842	1.00338	.6839
800.	1.0512	11860.8	.03939	3.5319	.00124	375.02	174.42	.08737	1.00317	.6837
850.	.9898	12646.6	.03915	3.5301	.00117	392.39	181.75	.09670	1.00299	.6836
900.	.9353	13446.6	.03888	3.5285	.00110	409.81	188.95	.10640	1.00282	.6835
950.	.8864	14261.9	.03859	3.5271	.00104	427.30	196.03	.11646	1.00267	.6836
1000.	.8424	15092.9	.03827	3.5258	.00099	444.87	203.00	.12686	1.00254	.6838
1100.	.7663	16791.9	.03762	3.5235	.00090	475.56	216.64	.14730	1.00231	.6909
1200.	.7028	18549.6	.03693	3.5216	.00083	511.01	229.91	.17035	1.00212	.6913
1300.	.6491	20365.2	.03622	3.5200	.00076	546.90	242.87	.19471	1.00196	.6918
1400.	.6030	22236.3	.03552	3.5186	.00071	583.21	255.53	.22038	1.00182	.6923
1500.	.5630	24159.5	.03483	3.5174	.00066	619.91	267.93	.24733	1.00170	.6927
1600.	.5279	26116.2	.03418	3.5163	.00062	656.64	280.08	.27559	1.00159	.6930
1700.	.4970	28120.2	.03356	3.5153	.00059	693.91	292.00	.30518	1.00150	.6931
1800.	.4695	30181.3	.03295	3.5144	.00055	732.19	303.69	.33620	1.00142	.6926
2000.	.4227	34566.7	.03165	3.5126	.00050	815.74	326.45	.40344	1.00127	.6892
2200.	.3842	39629.4	.03003	3.5102	.00045	920.98	344.92	.48041	1.00116	.6727
2400.	.3520	45957.3	.02788	3.5062	.00042	1070.58	366.34	.57276	1.00106	.6541
2600.	.3244	54443.0	.02511	3.4986	.00038	1298.13	387.44	.68771	1.00098	.6252
2800.	.3002	66223.9	.02188	3.4851	.00036	1646.12	408.46	.83113	1.00090	.5894
3000.	.2784	82563.1	.01855	3.4622	.00034	2161.83	429.75	1.00469	1.00084	.5531

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

4.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 15.080	.01263	1.4112	.9524	220.2	270.8	14.174	4.85	6.39	1364.
16.	.01274	1.3667	.9608	225.9	276.8	14.564	5.03	6.78	1358.
17.	.01286	1.2950	.9624	232.4	283.8	14.988	5.20	7.21	1340.
18.	.01298	1.2281	.9572	239.3	291.3	15.412	5.36	7.62	1322.
19.	.01312	1.1684	.9466	246.6	299.1	15.835	5.50	8.01	1304.
20.	.01326	1.1021	.9333	254.2	307.3	16.256	5.63	8.41	1283.
22.	.01358	.9817	.9023	270.6	324.9	17.097	5.85	9.21	1244.
24.	.01394	.8638	.8656	288.4	344.2	17.935	6.02	10.07	1202.
26.	.01436	.7467	.8221	307.8	365.2	18.776	6.15	11.01	1156.
28.	.01486	.6334	.7712	328.9	388.3	19.628	6.26	12.06	1105.
30.	.01545	.5290	.7135	351.8	413.5	20.500	6.33	13.22	1051.
32.	.01616	.4311	.6504	376.7	441.3	21.396	6.40	14.60	992.
34.	.01704	.3410	.5822	404.0	472.1	22.330	6.45	16.27	927.
36.	.01817	.2623	.5102	434.0	506.7	23.317	6.51	18.31	859.
38.	.01965	.1993	.4371	467.0	545.6	24.368	6.57	20.64	791.
40.	.02161	.1532	.3666	502.8	589.3	25.488	6.63	23.01	729.
42.	.02413	.1259	.3036	540.6	637.1	26.653	6.70	24.61	680.
44.	.02719	.1135	.2519	578.1	686.9	27.811	6.75	24.94	648.
46.	.03060	.1131	.2117	612.9	735.3	28.887	6.78	23.85	631.
48.	.03412	.1204	.1813	644.7	781.2	29.864	6.76	22.02	626.
50.	.03759	.1314	.1586	673.1	823.5	30.728	6.73	20.27	629.
55.	.04576	.1637	.1220	733.2	916.3	32.499	6.67	17.13	648.
60.	.05325	.1967	.1003	784.2	997.2	33.910	6.62	15.31	675.
65.	.06027	.2283	.0859	829.7	1070.8	35.087	6.60	14.22	701.
70.	.06699	.2590	.0754	872.3	1140.3	36.118	6.62	13.51	727.
75.	.07341	.2880	.0675	913.0	1206.7	37.034	6.66	13.06	751.
80.	.07964	.3159	.0612	952.6	1271.1	37.866	6.72	12.75	774.
90.	.09168	.3692	.0519	1030.1	1396.8	39.348	6.92	12.44	815.
100.	.10333	.4200	.0452	1107.3	1520.6	40.651	7.16	12.36	852.
110.	.11467	.4685	.0401	1186.4	1645.0	41.835	7.47	12.44	883.
120.	.12584	.5160	.0361	1266.6	1769.9	42.922	7.75	12.56	914.
140.	.14777	.6080	.0303	1433.2	2024.3	44.882	8.29	12.89	972.
160.	.16935	.6975	.0261	1608.1	2285.5	46.624	8.75	13.23	1027.
180.	.19069	.7854	.0230	1790.3	2553.1	48.200	9.14	13.53	1078.
200.	.21188	.8721	.0205	1978.7	2826.2	49.639	9.44	13.78	1128.
220.	.23295	.9579	.0186	2172.1	3103.9	50.962	9.69	13.98	1176.
240.	.25394	1.0431	.0169	2369.4	3385.1	52.186	9.88	14.14	1222.
260.	.27486	1.1278	.0156	2569.7	3669.2	53.324	10.02	14.26	1267.
280.	.29574	1.2122	.0144	2772.4	3955.4	54.384	10.13	14.35	1310.
300.	.31662	1.2969	.0135	2977.4	4243.9	55.377	10.21	14.41	1353.
350.	.36854	1.5058	.0115	3492.6	4966.7	57.607	10.32	14.49	1454.
400.	.42035	1.7139	.0100	4010.9	5692.3	59.545	10.36	14.52	1550.
450.	.47209	1.9215	.0089	4530.5	6418.9	61.256	10.38	14.53	1640.
500.	.52378	2.1287	.0080	5050.6	7145.7	62.787	10.40	14.54	1725.
550.	.57543	2.3356	.0073	5571.1	7872.8	64.173	10.41	14.55	1807.
600.	.62706	2.5424	.0067	6092.5	8600.7	65.437	10.43	14.56	1884.
650.	.67868	2.7491	.0062	6614.6	9329.3	66.600	10.45	14.58	1959.
700.	.73029	2.9556	.0057	7138.2	10059.4	67.689	10.48	14.61	2030.
750.	.78188	3.1621	.0053	7663.8	10791.3	68.700	10.52	14.65	2098.
800.	.83347	3.3686	.0050	8191.4	11525.3	69.648	10.57	14.70	2164.
850.	.88505	3.5750	.0047	8721.8	12262.0	70.540	10.63	14.76	2228.
900.	.93663	3.7814	.0044	9255.2	13001.7	71.385	10.70	14.83	2289.
950.	.98820	3.9877	.0042	9792.0	13744.8	72.187	10.77	14.90	2348.
1000.	1.03977	4.1941	.0040	10332.6	14491.6	72.952	10.86	14.99	2406.
1100.	1.14291	4.6067	.0036	11428.2	15999.8	74.379	11.04	15.17	2516.
1200.	1.24604	5.0193	.0033	12543.2	17527.4	75.701	11.24	15.37	2619.
1300.	1.34916	5.4318	.0031	13678.9	19075.5	76.939	11.45	15.58	2718.
1400.	1.45228	5.8443	.0029	14836.1	20645.2	78.110	11.68	15.80	2812.
1500.	1.55540	6.2568	.0027	16015.0	22236.6	79.222	11.90	16.03	2903.
1600.	1.65852	6.6693	.0025	17215.0	23849.1	80.255	12.12	16.25	2990.
1700.	1.76165	7.0818	.0024	18437.1	25483.7	81.242	12.34	16.47	3074.
1800.	1.86479	7.4942	.0022	19681.9	27141.1	82.188	12.57	16.70	3155.
2000.	2.07123	8.3192	.0020	22245.5	30530.4	83.984	13.07	17.21	3310.
2200.	2.27820	9.1440	.0018	24921.1	34033.9	85.645	13.75	17.92	3452.
2400.	2.48654	9.9689	.0017	27768.4	37714.5	87.241	14.77	19.02	3582.
2600.	2.69784	10.7938	.0015	30884.0	41675.4	88.825	16.35	20.75	3700.
2800.	2.91471	11.6186	.0014	34412.8	46071.7	90.458	18.71	23.39	3810.
3000.	3.14109	12.4435	.0013	38549.3	51113.7	92.205	22.06	27.21	3915.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

4.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 15.080	79.1477	750.0	.24825	111.6967	.00853	87.81	279.60	.00062	1.25909	2.0362
16.	78.5151	757.3	.24339	107.3080	.00895	94.38	250.48	.00064	1.25686	1.7997
17.	77.7893	755.0	.23774	100.7400	.00955	99.46	224.78	.00064	1.25430	1.6302
18.	77.0297	753.5	.23179	94.5996	.01012	103.30	203.80	.00063	1.25162	1.5042
19.	76.2330	753.7	.22567	89.0699	.01063	105.89	186.36	.00062	1.24882	1.4096
20.	75.4072	748.8	.21984	83.1052	.01123	108.33	171.72	.00061	1.24592	1.3330
22.	73.6412	738.1	.20952	72.2903	.01248	113.10	148.31	.00060	1.23974	1.2080
24.	71.7214	720.6	.20047	61.9555	.01397	115.35	130.37	.00058	1.23304	1.1378
26.	69.6206	696.1	.19190	51.9873	.01581	115.60	115.96	.00054	1.22573	1.1042
28.	67.3048	666.8	.18310	42.6332	.01809	114.26	103.90	.00051	1.21771	1.0968
30.	64.7413	634.6	.17400	34.2491	.02083	111.67	93.47	.00047	1.20888	1.1067
32.	61.8867	598.7	.16427	26.6805	.02438	107.24	84.19	.00043	1.19909	1.1458
34.	58.6740	559.2	.15372	20.0072	.02910	102.06	75.72	.00038	1.18813	1.2071
36.	55.0254	518.0	.14238	14.4332	.03535	96.18	67.85	.00034	1.17577	1.2918
38.	50.8854	478.9	.13066	10.1427	.04309	90.72	60.55	.00031	1.16186	1.3774
40.	46.2851	445.1	.11937	7.0906	.05170	85.54	53.96	.00029	1.14652	1.4517
42.	41.4430	422.8	.10935	5.2174	.05819	80.20	48.39	.00028	1.13053	1.4846
44.	36.7771	413.2	.10154	4.1750	.06034	75.22	44.10	.00030	1.11527	1.4618
46.	32.6747	416.4	.09553	3.6962	.05727	70.92	41.07	.00033	1.10197	1.3810
48.	29.3046	428.7	.09147	3.5296	.05137	67.57	39.07	.00038	1.09113	1.2733
50.	26.6002	446.5	.08856	3.4940	.04540	65.21	37.76	.00044	1.08248	1.1735
55.	21.8550	502.5	.08368	3.5772	.03409	62.34	36.24	.00060	1.06742	.9959
60.	18.7786	564.0	.08072	3.6932	.02715	61.82	36.10	.00077	1.05774	.8944
65.	16.5932	627.6	.07839	3.7886	.02266	62.69	36.67	.00096	1.05090	.8319
70.	14.9280	692.9	.07632	3.8661	.01950	63.91	37.59	.00114	1.04571	.7948
75.	13.6221	758.7	.07442	3.9234	.01721	64.91	38.70	.00131	1.04165	.7784
80.	12.5567	825.7	.07254	3.9672	.01544	66.55	39.92	.00150	1.03835	.7647
90.	10.9079	964.8	.06882	4.0274	.01289	72.00	42.51	.00191	1.03326	.7342
100.	9.6782	1110.6	.06530	4.0646	.01113	77.13	45.15	.00232	1.02947	.7235
110.	8.7207	1267.2	.06154	4.0861	.00981	82.19	46.60	.00273	1.02652	.7052
120.	7.9469	1425.4	.05864	4.1004	.00881	88.00	49.13	.00317	1.02415	.7011
140.	6.7673	1753.6	.05391	4.1147	.00735	99.99	54.14	.00413	1.02054	.6980
160.	5.9050	2089.3	.05045	4.1190	.00633	112.22	59.03	.00517	1.01791	.6959
180.	5.2440	2427.4	.04790	4.1185	.00557	124.34	63.79	.00631	1.01589	.6940
200.	4.7197	2764.0	.04603	4.1158	.00498	136.11	68.41	.00754	1.01429	.6924
220.	4.2927	3098.3	.04461	4.1120	.00451	147.43	72.90	.00884	1.01299	.6914
240.	3.9379	3427.6	.04356	4.1077	.00413	158.25	77.28	.01023	1.01192	.6905
260.	3.6382	3751.7	.04277	4.1033	.00380	168.60	81.55	.01170	1.01100	.6898
280.	3.3814	4070.4	.04218	4.0989	.00353	178.50	85.72	.01324	1.01023	.6891
300.	3.1584	4385.9	.04173	4.0961	.00329	188.00	89.81	.01487	1.00955	.6883
350.	2.7134	5149.9	.04107	4.0859	.00281	210.28	99.66	.01925	1.00820	.6869
400.	2.3790	5896.4	.04073	4.0774	.00246	230.95	109.08	.02407	1.00719	.6859
450.	2.1183	6633.0	.04055	4.0702	.00219	250.49	118.13	.02930	1.00640	.6852
500.	1.9092	7369.9	.04039	4.0641	.00197	269.25	126.86	.03492	1.00576	.6851
550.	1.7378	8105.5	.04027	4.0589	.00179	287.46	135.32	.04093	1.00525	.6849
600.	1.5947	8845.0	.04014	4.0544	.00165	305.29	143.53	.04732	1.00481	.6847
650.	1.4734	9588.6	.04001	4.0506	.00152	322.89	151.53	.05410	1.00445	.6844
700.	1.3693	10341.5	.03985	4.0472	.00141	340.34	159.33	.06123	1.00413	.6842
750.	1.2790	11103.1	.03966	4.0443	.00132	357.71	166.96	.06872	1.00386	.6839
800.	1.1998	11876.0	.03944	4.0417	.00124	375.06	174.43	.07655	1.00362	.6837
850.	1.1299	12661.9	.03920	4.0393	.00117	392.42	181.76	.08472	1.00341	.6836
900.	1.0677	13462.1	.03893	4.0372	.00110	409.84	188.96	.09321	1.00322	.6836
950.	1.0119	14277.4	.03863	4.0353	.00104	427.33	196.04	.10201	1.00305	.6837
1000.	.9617	15108.6	.03831	4.0336	.00099	444.90	203.01	.11112	1.00290	.6839
1100.	.8750	16807.8	.03765	4.0307	.00090	475.56	216.65	.12901	1.00264	.6909
1200.	.8025	18565.8	.03696	4.0282	.00083	511.01	229.92	.14918	1.00242	.6914
1300.	.7412	20381.6	.03625	4.0261	.00076	546.90	242.87	.17051	1.00223	.6918
1400.	.6886	22252.9	.03554	4.0242	.00071	583.20	255.54	.19297	1.00208	.6923
1500.	.6429	24176.1	.03485	4.0227	.00066	619.89	267.93	.21657	1.00194	.6928
1600.	.6029	26132.4	.03421	4.0212	.00062	656.59	280.08	.24129	1.00182	.6931
1700.	.5677	28134.8	.03359	4.0200	.00059	693.79	292.00	.25718	1.00171	.6931
1800.	.5363	30192.4	.03298	4.0188	.00055	731.94	303.70	.29431	1.00162	.6927
2000.	.4828	34557.8	.03170	4.0165	.00050	814.69	326.46	.35302	1.00146	.6895
2200.	.4389	39562.4	.03012	4.0137	.00045	917.70	344.92	.41997	1.00132	.6736
2400.	.4022	45754.4	.02805	4.0091	.00042	1062.13	366.33	.49986	1.00121	.6560
2600.	.3707	53968.7	.02538	4.0009	.00038	1279.42	387.41	.59878	1.00112	.6284
2800.	.3431	65271.9	.02225	3.9862	.00036	1609.45	408.39	.72196	1.00103	.5936
3000.	.3184	80853.3	.01899	3.9615	.00034	2096.71	429.59	.87127	1.00096	.5576

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

4.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 15.232	.01260	1.4432	.9555	220.6	277.3	14.185	4.87	6.39	1377.
16.	.01268	1.4034	.9633	225.3	282.3	14.508	5.02	6.72	1371.
17.	.01279	1.3367	.9665	231.7	289.2	14.928	5.20	7.14	1355.
18.	.01291	1.2697	.9636	238.5	296.6	15.348	5.35	7.55	1338.
19.	.01305	1.2083	.9555	245.6	304.3	15.766	5.50	7.94	1321.
20.	.01318	1.1495	.9426	253.1	312.5	16.184	5.62	8.31	1303.
22.	.01349	1.0255	.9131	269.1	329.8	17.014	5.84	9.10	1264.
24.	.01383	.9090	.8779	286.6	348.8	17.840	6.02	9.91	1224.
26.	.01423	.7936	.8364	305.5	369.5	18.665	6.15	10.79	1180.
28.	.01469	.6827	.7880	325.9	392.1	19.499	6.25	11.76	1132.
30.	.01523	.5791	.7334	348.0	416.6	20.346	6.34	12.80	1082.
32.	.01588	.4825	.6739	371.9	443.4	21.210	6.40	14.00	1027.
34.	.01666	.3931	.6105	397.8	472.7	22.099	6.46	15.40	968.
36.	.01762	.3149	.5439	425.8	505.1	23.024	6.51	17.00	907.
38.	.01882	.2491	.4760	456.2	540.9	23.991	6.55	18.80	845.
40.	.02035	.1983	.4100	488.7	580.3	25.001	6.59	20.63	788.
42.	.02226	.1636	.3490	522.9	623.1	26.045	6.64	22.13	739.
44.	.02457	.1433	.2961	557.7	668.3	27.096	6.68	22.93	701.
46.	.02722	.1345	.2524	591.2	713.7	28.105	6.74	22.88	676.
48.	.03008	.1345	.2174	623.3	758.7	29.063	6.76	22.02	662.
50.	.03301	.1411	.1900	652.8	801.4	29.934	6.75	20.69	658.
55.	.04020	.1676	.1445	716.2	897.1	31.762	6.70	17.77	667.
60.	.04693	.1989	.1176	769.8	981.0	33.224	6.64	15.84	689.
65.	.05326	.2299	.1000	817.3	1056.9	34.439	6.62	14.64	713.
70.	.05929	.2600	.0874	861.3	1128.0	35.493	6.64	13.86	737.
75.	.06508	.2893	.0779	903.1	1195.9	36.431	6.68	13.34	760.
80.	.07075	.3179	.0704	943.6	1262.0	37.283	6.74	12.98	782.
90.	.08158	.3719	.0594	1022.5	1389.6	38.788	6.93	12.60	822.
100.	.09205	.4233	.0516	1100.7	1514.9	40.107	7.17	12.49	859.
110.	.10221	.4724	.0456	1180.6	1640.6	41.303	7.49	12.54	889.
120.	.11221	.5203	.0410	1261.5	1766.4	42.398	7.77	12.65	920.
140.	.13182	.6131	.0342	1429.0	2022.2	44.369	8.30	12.95	978.
160.	.15108	.7032	.0295	1604.6	2284.4	46.118	8.76	13.27	1032.
180.	.17012	.7915	.0259	1787.3	2552.8	47.699	9.14	13.56	1084.
200.	.18900	.8785	.0231	1976.1	2826.6	49.141	9.45	13.81	1133.
220.	.20778	.9647	.0209	2169.7	3104.7	50.466	9.70	14.01	1180.
240.	.22647	1.0502	.0191	2367.3	3386.4	51.692	9.88	14.16	1227.
260.	.24509	1.1351	.0176	2567.9	3670.8	52.831	10.03	14.28	1271.
280.	.26367	1.2196	.0163	2770.8	3957.3	53.892	10.13	14.36	1315.
300.	.28226	1.3046	.0152	2976.0	4246.2	54.887	10.21	14.42	1357.
350.	.32846	1.5139	.0129	3491.5	4969.5	57.118	10.32	14.50	1458.
400.	.37453	1.7221	.0113	4010.0	5695.4	59.057	10.37	14.53	1554.
450.	.42054	1.9298	.0100	4529.8	6422.2	60.768	10.38	14.53	1644.
500.	.46650	2.1371	.0090	5050.0	7149.2	62.300	10.40	14.54	1729.
550.	.51242	2.3441	.0082	5570.6	7876.5	63.687	10.41	14.55	1810.
600.	.55833	2.5509	.0075	6092.1	8604.5	64.950	10.43	14.57	1888.
650.	.60421	2.7576	.0069	6614.2	9333.2	66.113	10.45	14.58	1962.
700.	.65009	2.9642	.0064	7137.9	10063.3	67.202	10.48	14.62	2033.
750.	.69595	3.1707	.0060	7663.5	10795.3	68.214	10.52	14.65	2101.
800.	.74181	3.3772	.0056	8191.2	11529.3	69.162	10.57	14.70	2167.
850.	.78767	3.5836	.0053	8721.5	12266.0	70.054	10.63	14.76	2231.
900.	.83352	3.7900	.0050	9255.0	13005.8	70.899	10.70	14.83	2292.
950.	.87936	3.9964	.0047	9791.8	13748.9	71.701	10.78	14.90	2351.
1000.	.92521	4.2028	.0045	10332.4	14495.8	72.466	10.86	14.99	2408.
1100.	1.01688	4.6154	.0041	11428.1	16004.1	73.893	11.04	15.17	2518.
1200.	1.10856	5.0280	.0038	12543.1	17531.6	75.215	11.24	15.37	2622.
1300.	1.20022	5.4405	.0035	13678.8	19079.8	76.453	11.45	15.58	2720.
1400.	1.29189	5.8531	.0032	14836.0	20649.5	77.624	11.68	15.80	2814.
1500.	1.38355	6.2656	.0030	16015.0	22240.9	78.736	11.90	16.03	2905.
1600.	1.47521	6.6780	.0028	17214.9	23853.4	79.769	12.12	16.25	2992.
1700.	1.56688	7.0905	.0026	18436.9	25487.9	80.756	12.34	16.47	3076.
1800.	1.65856	7.5030	.0025	19681.6	27145.1	81.702	12.56	16.69	3157.
2000.	1.84205	8.3279	.0023	22243.8	30533.1	83.497	13.06	17.20	3312.
2200.	2.02599	9.1528	.0020	24915.5	34032.5	85.157	13.72	17.89	3454.
2400.	2.21108	9.9777	.0019	27752.7	37702.6	86.748	14.70	18.94	3585.
2600.	2.39864	10.8025	.0017	30846.3	41640.2	88.323	16.21	20.59	3704.
2800.	2.59089	11.6274	.0016	34332.5	45991.5	89.939	18.44	23.09	3814.
3000.	2.79110	12.4522	.0015	38394.4	50954.4	91.659	21.62	26.71	3920.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

4.50 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 15.232	79.3938	766.8	.24735	114.5792	.00834	89.52	282.70	.00063	1.25996	2.0195
16.	78.8723	772.0	.24341	110.6887	.00870	94.96	257.81	.00065	1.25812	1.8241
17.	78.1707	771.9	.23795	104.4887	.00925	100.18	231.28	.00065	1.25564	1.6484
18.	77.4308	770.4	.23239	98.3177	.00980	104.15	209.57	.00064	1.25303	1.5193
19.	76.6538	769.6	.22679	92.6204	.01032	106.84	191.52	.00063	1.25030	1.4233
20.	75.8466	768.7	.22101	87.1866	.01081	109.38	176.36	.00062	1.24746	1.3400
22.	74.1404	757.4	.21083	76.0343	.01201	114.40	152.35	.00061	1.24148	1.2112
24.	72.2864	741.7	.20190	65.7108	.01336	116.88	133.98	.00059	1.23501	1.1360
26.	70.2702	719.6	.19351	55.7675	.01500	117.38	119.32	.00056	1.22799	1.0970
28.	68.0646	693.3	.18494	46.4646	.01696	116.32	107.14	.00052	1.22034	1.0828
30.	65.6455	663.7	.17625	38.0176	.01929	114.06	96.69	.00049	1.21199	1.0854
32.	62.9829	631.1	.16713	30.3883	.02218	110.01	87.48	.00045	1.20284	1.1130
34.	60.0389	595.3	.15750	23.6027	.02586	105.30	79.18	.00041	1.19278	1.1578
36.	56.7616	558.8	.14728	17.8759	.03042	100.03	71.56	.00037	1.18165	1.2161
38.	53.1234	522.7	.13675	13.2338	.03597	94.42	64.56	.00034	1.16937	1.2855
40.	49.1419	490.4	.12658	9.7468	.04207	89.77	58.23	.00032	1.15603	1.3383
42.	44.9258	466.1	.11707	7.3507	.04748	84.96	52.72	.00031	1.14202	1.3733
44.	40.7023	451.7	.10888	5.8314	.05078	80.32	48.20	.00031	1.12810	1.3762
46.	36.7421	448.0	.10192	4.9417	.05108	76.17	44.74	.00033	1.11516	1.3441
48.	33.2447	452.8	.09679	4.4701	.04863	72.67	42.26	.00036	1.10381	1.2803
50.	30.2903	465.3	.09297	4.2725	.04446	69.91	40.55	.00040	1.09429	1.1999
55.	24.8786	512.8	.08675	4.1706	.03465	65.98	38.33	.00054	1.07700	1.0322
60.	21.3096	570.5	.08312	4.2379	.02776	64.72	37.70	.00069	1.06570	.9225
65.	18.7767	632.0	.08039	4.3168	.02316	65.12	37.91	.00085	1.05773	.8522
70.	16.8676	695.7	.07804	4.3848	.01993	66.03	38.59	.00102	1.05176	.8102
75.	15.3652	761.4	.07590	4.4454	.01752	66.71	39.53	.00117	1.04707	.7907
80.	14.1347	828.8	.07385	4.4935	.01566	68.16	40.63	.00134	1.04324	.7737
90.	12.2574	967.9	.06989	4.5584	.01302	73.40	43.05	.00171	1.03743	.7393
100.	10.8641	1113.9	.06621	4.5988	.01121	78.38	45.60	.00208	1.03312	.7266
110.	9.7836	1271.6	.06222	4.6214	.00986	83.20	46.99	.00244	1.02979	.7083
120.	8.9120	1430.2	.05924	4.6365	.00884	88.87	49.44	.00284	1.02711	.7035
140.	7.5863	1759.4	.05438	4.6509	.00736	100.63	54.36	.00369	1.02305	.6997
160.	6.6190	2096.1	.05082	4.6543	.00633	112.71	59.20	.00462	1.02009	.6973
180.	5.8782	2435.1	.04822	4.6525	.00557	124.73	63.93	.00563	1.01782	.6952
200.	5.2909	2772.7	.04629	4.6482	.00498	136.43	68.52	.00672	1.01603	.6934
220.	4.8129	3107.8	.04484	4.6429	.00451	147.69	73.00	.00789	1.01458	.6922
240.	4.4157	3437.8	.04376	4.6371	.00412	158.47	77.36	.00912	1.01337	.6912
260.	4.0801	3762.5	.04295	4.6313	.00379	168.78	81.62	.01043	1.01235	.6904
280.	3.7926	4081.8	.04235	4.6256	.00352	178.66	85.79	.01181	1.01147	.6897
300.	3.5428	4398.2	.04188	4.6220	.00328	188.14	89.86	.01326	1.01072	.6888
350.	3.0445	5163.0	.04119	4.6090	.00281	210.39	99.71	.01716	1.00920	.6872
400.	2.6700	5910.0	.04084	4.5980	.00246	231.04	109.12	.02144	1.00807	.6862
450.	2.3779	6647.0	.04064	4.5888	.00219	250.57	118.16	.02610	1.00718	.6854
500.	2.1436	7384.2	.04048	4.5811	.00197	269.31	126.89	.03110	1.00647	.6853
550.	1.9515	8120.0	.04035	4.5745	.00179	287.51	135.34	.03645	1.00589	.6850
600.	1.7911	8859.7	.04021	4.5688	.00164	305.34	143.55	.04214	1.00541	.6848
650.	1.6550	9603.4	.04007	4.5640	.00152	322.93	151.55	.04816	1.00500	.6844
700.	1.5383	10356.5	.03990	4.5597	.00141	340.38	159.35	.05450	1.00464	.6842
750.	1.4369	11118.2	.03971	4.5560	.00132	357.74	166.98	.06117	1.00434	.6839
800.	1.3480	11891.2	.03950	4.5526	.00124	375.09	174.45	.06814	1.00407	.6837
850.	1.2696	12677.2	.03925	4.5497	.00116	392.45	181.78	.07540	1.00383	.6836
900.	1.1997	13477.5	.03897	4.5470	.00110	409.87	188.98	.08295	1.00362	.6836
950.	1.1372	14293.0	.03867	4.5447	.00104	427.35	196.05	.09078	1.00343	.6837
1000.	1.0808	15124.3	.03835	4.5425	.00099	444.93	203.02	.09888	1.00326	.6839
1100.	.9834	16823.8	.03769	4.5388	.00090	475.56	216.66	.11478	1.00297	.6910
1200.	.9021	18581.9	.03699	4.5356	.00083	511.01	229.93	.13272	1.00272	.6914
1300.	.8332	20398.0	.03628	4.5329	.00076	546.90	242.88	.15168	1.00251	.6919
1400.	.7741	22269.5	.03557	4.5306	.00071	583.20	255.54	.17166	1.00233	.6923
1500.	.7228	24192.7	.03487	4.5286	.00066	619.88	267.94	.19263	1.00218	.6928
1600.	.6779	26148.6	.03423	4.5268	.00062	656.56	280.09	.21462	1.00204	.6931
1700.	.6382	28149.9	.03361	4.5252	.00058	693.70	292.01	.23763	1.00192	.6932
1800.	.6029	30204.6	.03300	4.5238	.00055	731.72	303.70	.26173	1.00182	.6928
2000.	.5429	34553.5	.03174	4.5210	.00050	813.83	326.46	.31383	1.00164	.6898
2200.	.4936	39510.0	.03020	4.5177	.00045	914.98	344.91	.37305	1.00149	.6743
2400.	.4523	45589.6	.02820	4.5126	.00042	1055.13	366.32	.44338	1.00136	.6576
2600.	.4169	53579.1	.02562	4.5036	.00038	1263.92	387.38	.53005	1.00126	.6311
2800.	.3860	64486.2	.02258	4.4878	.00036	1579.04	408.32	.63777	1.00116	.5972
3000.	.3583	79438.4	.01937	4.4614	.00034	2042.68	429.46	.76849	1.00108	.5615

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

5.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 15.382	.01256	1.4746	.9589	220.9	283.7	14.196	4.88	6.40	1390.
16.	.01262	1.4419	.9656	224.6	287.8	14.454	5.01	6.66	1384.
17.	.01273	1.3771	.9705	231.0	294.6	14.870	5.19	7.07	1370.
18.	.01285	1.3108	.9690	237.6	301.9	15.286	5.35	7.48	1354.
19.	.01298	1.2480	.9623	244.7	309.6	15.700	5.49	7.87	1337.
20.	.01311	1.1937	.9514	252.1	317.6	16.113	5.62	8.22	1322.
22.	.01340	1.0703	.9233	267.8	334.8	16.935	5.84	8.98	1284.
24.	.01373	.9542	.8895	284.9	353.6	17.750	6.01	9.76	1245.
26.	.01411	.8409	.8497	303.4	373.9	18.562	6.15	10.59	1204.
28.	.01454	.7307	.8035	323.3	396.0	19.379	6.26	11.49	1158.
30.	.01504	.6262	.7516	344.7	419.9	20.205	6.34	12.47	1109.
32.	.01563	.5319	.6951	367.7	445.9	21.042	6.41	13.51	1059.
34.	.01633	.4434	.6355	392.4	474.1	21.896	6.46	14.72	1005.
36.	.01717	.3645	.5731	419.0	504.8	22.775	6.51	16.07	949.
38.	.01820	.2981	.5095	447.4	538.4	23.682	6.55	17.50	893.
40.	.01945	.2443	.4470	477.6	574.9	24.617	6.57	18.95	839.
42.	.02098	.2041	.3883	509.2	614.2	25.575	6.60	20.27	791.
44.	.02281	.1771	.3356	541.7	655.7	26.542	6.64	21.20	752.
46.	.02491	.1615	.2903	573.5	698.1	27.483	6.70	21.50	721.
48.	.02724	.1555	.2525	604.9	741.1	28.398	6.73	21.34	702.
50.	.02970	.1565	.2217	634.6	783.1	29.256	6.74	20.60	691.
55.	.03597	.1756	.1681	700.1	880.0	31.105	6.72	18.17	689.
60.	.04202	.2035	.1358	755.9	966.0	32.604	6.66	16.27	705.
65.	.04776	.2333	.1147	805.1	1043.9	33.851	6.64	15.00	726.
70.	.05325	.2631	.0997	850.5	1116.7	34.930	6.65	14.16	748.
75.	.05853	.2918	.0886	893.3	1186.0	35.887	6.69	13.60	770.
80.	.06365	.3204	.0799	934.7	1252.9	36.751	6.76	13.21	791.
90.	.07355	.3752	.0670	1015.0	1382.7	38.281	6.94	12.77	831.
100.	.08306	.4271	.0580	1094.2	1509.4	39.616	7.18	12.51	866.
110.	.09227	.4766	.0511	1175.0	1636.3	40.823	7.50	12.64	896.
120.	.10133	.5249	.0459	1256.4	1763.1	41.926	7.78	12.73	927.
140.	.11907	.6184	.0383	1424.9	2020.2	43.908	8.31	13.01	984.
160.	.13648	.7090	.0329	1601.1	2283.5	45.664	8.77	13.32	1038.
180.	.15367	.7977	.0289	1784.3	2552.6	47.249	9.15	13.60	1089.
200.	.17071	.8851	.0258	1973.4	2827.0	48.694	9.46	13.83	1138.
220.	.18764	.9716	.0233	2167.4	3105.6	50.022	9.70	14.03	1185.
240.	.20449	1.0573	.0213	2365.3	3387.7	51.250	9.89	14.18	1231.
260.	.22128	1.1424	.0196	2566.1	3672.5	52.390	10.03	14.29	1276.
280.	.23802	1.2271	.0181	2769.1	3959.2	53.452	10.14	14.38	1319.
300.	.25478	1.3124	.0169	2974.6	4248.5	54.448	10.22	14.43	1362.
350.	.29639	1.5219	.0144	3490.4	4972.3	56.681	10.32	14.51	1462.
400.	.33788	1.7303	.0126	4009.2	5698.6	58.620	10.37	14.53	1557.
450.	.37930	1.9381	.0112	4529.1	6425.6	60.332	10.38	14.54	1647.
500.	.42067	2.1455	.0100	5049.4	7152.8	61.864	10.40	14.55	1732.
550.	.46201	2.3525	.0091	5570.1	7880.2	63.251	10.41	14.55	1813.
600.	.50333	2.5594	.0083	6091.7	8608.3	64.515	10.43	14.57	1891.
650.	.54464	2.7662	.0077	6613.9	9337.1	65.678	10.45	14.59	1965.
700.	.58593	2.9728	.0072	7137.6	10067.3	66.767	10.48	14.62	2036.
750.	.62721	3.1793	.0067	7663.3	10799.3	67.779	10.52	14.65	2104.
800.	.66849	3.3858	.0063	8190.9	11533.4	68.727	10.57	14.70	2170.
850.	.70976	3.5923	.0059	8721.3	12270.1	69.619	10.63	14.76	2233.
900.	.75103	3.7987	.0056	9254.8	13009.9	70.464	10.70	14.83	2294.
950.	.79229	4.0051	.0053	9791.7	13753.1	71.266	10.78	14.90	2354.
1000.	.83355	4.2114	.0050	10332.3	14500.0	72.032	10.86	14.99	2411.
1100.	.91606	4.6241	.0045	11428.0	16008.3	73.459	11.04	15.17	2520.
1200.	.99857	5.0367	.0042	12543.0	17535.9	74.780	11.24	15.37	2624.
1300.	1.08107	5.4492	.0038	13678.8	19084.1	76.019	11.45	15.58	2722.
1400.	1.16357	5.8618	.0036	14835.9	20653.8	77.189	11.68	15.80	2816.
1500.	1.24607	6.2743	.0033	16014.9	22245.3	78.301	11.90	16.03	2907.
1600.	1.32856	6.6867	.0031	17214.8	23857.6	79.335	12.12	16.25	2994.
1700.	1.41107	7.0992	.0029	18436.8	25492.1	80.321	12.34	16.47	3078.
1800.	1.49358	7.5117	.0028	19681.2	27149.1	81.267	12.56	16.69	3159.
2000.	1.65871	8.3366	.0025	22242.5	30536.1	83.062	13.05	17.19	3314.
2200.	1.82423	9.1615	.0023	24910.9	34032.0	84.720	13.69	17.86	3457.
2400.	1.99073	9.9864	.0021	27739.5	37693.1	86.307	14.64	18.88	3588.
2600.	2.15934	10.8112	.0019	30814.3	41611.8	87.874	16.08	20.45	3707.
2800.	2.33195	11.6361	.0018	34264.5	45924.3	89.476	18.22	22.84	3818.
3000.	2.51137	12.4609	.0017	38263.4	50820.3	91.173	21.24	26.28	3924.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

5.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 15.382	79.6358	783.3	.24654	117.4329	.00817	91.18	285.79	.00064	1.26081	2.0048
16.	79.2264	787.3	.24343	114.2398	.00845	95.54	265.42	.00065	1.25937	1.8489
17.	78.5408	788.2	.23818	108.1565	.00897	100.89	237.88	.00065	1.25695	1.6676
18.	77.8155	787.1	.23283	101.9981	.00950	104.96	215.35	.00065	1.25439	1.5342
19.	77.0622	786.1	.22740	96.1733	.01001	107.77	196.75	.00064	1.25174	1.4358
20.	76.2761	787.1	.22203	91.0477	.01045	110.42	181.10	.00063	1.24897	1.3490
22.	74.6146	777.0	.21204	79.8570	.01156	115.65	156.35	.00062	1.24314	1.2146
24.	72.8222	762.8	.20319	69.4869	.01280	118.35	137.55	.00060	1.23688	1.1348
26.	70.8805	743.0	.19495	59.6057	.01425	119.08	122.61	.00057	1.23011	1.0906
28.	68.7720	718.7	.18661	50.2511	.01599	118.27	110.29	.00054	1.22279	1.0716
30.	66.4752	690.6	.17822	41.6295	.01805	116.30	99.78	.00051	1.21485	1.0697
32.	63.9697	661.5	.16954	34.0273	.02043	112.55	90.59	.00047	1.20623	1.0875
34.	61.2349	628.9	.16063	27.1527	.02341	108.23	82.39	.00043	1.19686	1.1206
36.	58.2355	595.3	.15124	21.2278	.02700	103.42	74.94	.00040	1.18664	1.1646
38.	54.9544	562.8	.14161	16.3795	.03110	98.23	68.14	.00037	1.17554	1.2141
40.	51.4071	532.5	.13227	12.5594	.03559	93.45	61.98	.00035	1.16360	1.2569
42.	47.6583	507.6	.12338	9.7251	.03993	89.04	56.55	.00033	1.15109	1.2872
44.	43.8420	490.4	.11527	7.7629	.04323	84.73	51.94	.00033	1.13844	1.2996
46.	40.1370	482.4	.10789	6.4812	.04479	80.76	48.24	.00034	1.12625	1.2903
48.	36.7078	482.5	.10215	5.7089	.04424	77.26	45.39	.00035	1.11504	1.2541
50.	33.6647	489.5	.09763	5.2680	.04208	74.34	43.31	.00039	1.10517	1.2001
55.	27.7977	527.6	.09002	4.8808	.03444	69.62	40.43	.00050	1.08630	1.0551
60.	23.7978	580.1	.08565	4.8435	.02804	67.68	39.37	.00063	1.07357	.9463
65.	20.9367	638.9	.08246	4.8841	.02348	67.59	39.24	.00077	1.06453	.8710
70.	18.7801	701.4	.07981	4.9402	.02019	68.17	39.67	.00092	1.05775	.8241
75.	17.0856	765.6	.07743	4.9860	.01776	68.53	40.43	.00106	1.05244	.8023
80.	15.7118	832.6	.07524	5.0342	.01587	69.81	41.39	.00121	1.04815	.7832
90.	13.5961	972.0	.07098	5.1010	.01313	74.82	43.63	.00155	1.04157	.7444
100.	12.0401	1118.1	.06712	5.1426	.01128	79.64	46.07	.00189	1.03675	.7296
110.	10.8375	1276.7	.06291	5.1649	.00990	84.27	47.41	.00221	1.03304	.7113
120.	9.8688	1435.7	.05983	5.1798	.00887	89.78	49.78	.00257	1.03005	.7058
140.	8.3984	1765.6	.05483	5.1932	.00737	101.31	54.61	.00334	1.02554	.7013
160.	7.3272	2103.3	.05119	5.1949	.00633	113.23	59.39	.00418	1.02225	.6986
180.	6.5075	2443.2	.04852	5.1912	.00557	125.13	64.07	.00509	1.01975	.6963
200.	5.8579	2781.6	.04656	5.1850	.00497	136.75	68.64	.00608	1.01776	.6944
220.	5.3293	3117.4	.04507	5.1778	.00450	147.95	73.10	.00712	1.01615	.6931
240.	4.8902	3448.1	.04397	5.1703	.00411	158.69	77.45	.00824	1.01481	.6920
260.	4.5191	3773.5	.04314	5.1628	.00379	168.97	81.70	.00942	1.01368	.6911
280.	4.2013	4093.3	.04251	5.1556	.00351	178.83	85.86	.01066	1.01272	.6902
300.	3.9249	4410.6	.04203	5.1512	.00327	188.29	89.93	.01197	1.01188	.6892
350.	3.3740	5176.2	.04132	5.1348	.00280	210.50	99.76	.01548	1.01020	.6875
400.	2.9596	5923.7	.04095	5.1212	.00245	231.13	109.16	.01934	1.00895	.6864
450.	2.6365	6661.1	.04074	5.1097	.00218	250.64	118.20	.02354	1.00797	.6856
500.	2.3772	7398.6	.04056	5.1001	.00197	269.37	126.92	.02804	1.00718	.6854
550.	2.1644	8134.6	.04042	5.0919	.00179	287.56	135.37	.03286	1.00654	.6851
600.	1.9868	8874.4	.04028	5.0849	.00164	305.39	143.57	.03799	1.00600	.6849
650.	1.8361	9618.3	.04014	5.0789	.00152	322.98	151.56	.04341	1.00554	.6845
700.	1.7067	10371.5	.03996	5.0736	.00141	340.42	159.36	.04913	1.00515	.6843
750.	1.5944	11133.3	.03977	5.0690	.00132	357.78	166.99	.05513	1.00481	.6840
800.	1.4959	11906.4	.03955	5.0649	.00123	375.12	174.46	.06140	1.00451	.6838
850.	1.4089	12692.5	.03930	5.0613	.00116	392.49	181.79	.06794	1.00425	.6836
900.	1.3315	13492.9	.03902	5.0580	.00110	409.90	188.99	.07474	1.00402	.6836
950.	1.2622	14308.5	.03871	5.0551	.00104	427.38	196.07	.08179	1.00381	.6837
1000.	1.1997	15140.0	.03839	5.0524	.00099	444.95	203.03	.08909	1.00362	.6839
1100.	1.0916	16839.7	.03772	5.0478	.00090	475.56	216.67	.10340	1.00329	.6910
1200.	1.0014	18598.1	.03702	5.0439	.00083	511.01	229.94	.11955	1.00302	.6914
1300.	.9250	20414.4	.03631	5.0406	.00076	546.89	242.89	.13662	1.00279	.6919
1400.	.8594	22286.1	.03560	5.0377	.00071	583.20	255.55	.15461	1.00259	.6924
1500.	.8025	24209.4	.03490	5.0352	.00066	619.87	267.95	.17349	1.00242	.6928
1600.	.7527	26165.0	.03425	5.0331	.00062	656.53	280.10	.19328	1.00227	.6931
1700.	.7087	28165.3	.03363	5.0311	.00058	693.62	292.01	.21399	1.00214	.6932
1800.	.6695	30217.6	.03303	5.0293	.00055	731.54	303.71	.23568	1.00202	.6929
2000.	.6029	34552.6	.03178	5.0259	.00050	813.09	326.47	.28249	1.00182	.6901
2200.	.5482	39468.6	.03027	5.0221	.00045	912.68	344.91	.33558	1.00165	.6750
2400.	.5023	45453.1	.02832	5.0164	.00042	1049.20	366.31	.39834	1.00151	.6590
2600.	.4631	53252.5	.02582	5.0067	.00038	1250.81	387.36	.47538	1.00140	.6334
2800.	.4288	63824.3	.02286	4.9898	.00036	1553.30	408.27	.57092	1.00129	.6003
3000.	.3982	78243.2	.01970	4.9618	.00034	1996.91	429.34	.68695	1.00120	.5651

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

5.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 15.531	.01252	1.5053	.9626	221.3	290.2	14.208	4.90	6.40	1402.
16.	.01257	1.4794	.9678	224.1	293.2	14.401	5.00	6.60	1398.
17.	.01267	1.4145	.9740	230.3	300.0	14.814	5.18	7.01	1384.
18.	.01279	1.3505	.9738	236.9	307.2	15.226	5.34	7.41	1369.
19.	.01291	1.2864	.9688	243.8	314.8	15.636	5.49	7.80	1352.
20.	.01304	1.2306	.9596	251.1	322.8	16.045	5.61	8.16	1337.
22.	.01332	1.1133	.9329	266.6	339.8	16.859	5.83	8.88	1302.
24.	.01364	.9969	.9004	283.3	358.3	17.664	6.01	9.64	1265.
26.	.01399	.8851	.8622	301.4	378.4	18.464	6.15	10.42	1225.
28.	.01440	.7757	.8181	320.9	400.1	19.266	6.26	11.27	1182.
30.	.01487	.6738	.7684	341.7	423.5	20.074	6.35	12.16	1136.
32.	.01542	.5794	.7145	364.0	448.7	20.889	6.42	13.12	1088.
34.	.01605	.4923	.6579	387.7	476.0	21.715	6.47	14.17	1038.
36.	.01680	.4141	.5988	413.1	505.5	22.558	6.51	15.31	987.
38.	.01770	.3457	.5388	440.0	537.4	23.419	6.55	16.54	934.
40.	.01877	.2885	.4794	468.5	571.7	24.299	6.57	17.79	884.
42.	.02004	.2449	.4228	498.2	608.4	25.194	6.59	18.91	838.
44.	.02154	.2132	.3709	528.7	647.2	26.096	6.62	19.80	798.
46.	.02327	.1921	.3250	558.9	686.9	26.978	6.68	20.38	766.
48.	.02519	.1807	.2856	589.2	727.8	27.848	6.72	20.47	742.
50.	.02726	.1766	.2525	618.5	768.5	28.679	6.74	20.15	727.
55.	.03272	.1872	.1922	685.0	865.0	30.521	6.73	18.35	714.
60.	.03815	.2110	.1546	742.6	952.4	32.044	6.68	16.57	723.
65.	.04337	.2387	.1299	793.3	1031.9	33.315	6.66	15.31	741.
70.	.04839	.2675	.1125	839.9	1106.1	34.416	6.67	14.43	761.
75.	.05323	.2961	.0996	883.8	1176.6	35.389	6.71	13.82	781.
80.	.05792	.3243	.0895	926.0	1244.6	36.267	6.77	13.41	801.
90.	.06701	.3791	.0748	1007.6	1376.2	37.819	6.95	12.93	839.
100.	.07573	.4314	.0646	1087.8	1504.3	39.167	7.19	12.73	874.
110.	.08416	.4812	.0568	1169.4	1632.3	40.386	7.52	12.74	903.
120.	.09245	.5298	.0509	1251.5	1759.9	41.497	7.79	12.81	933.
140.	.10866	.6239	.0423	1420.8	2018.4	43.489	8.32	13.07	990.
160.	.12454	.7150	.0363	1597.6	2282.6	45.251	8.78	13.36	1043.
180.	.14022	.8041	.0319	1781.3	2552.5	46.841	9.16	13.63	1094.
200.	.15575	.8919	.0284	1970.9	2827.5	48.289	9.46	13.86	1143.
220.	.17117	.9786	.0257	2165.2	3106.6	49.619	9.70	14.05	1190.
240.	.18652	1.0645	.0234	2363.3	3389.1	50.849	9.89	14.20	1236.
260.	.20180	1.1498	.0215	2564.3	3674.2	51.990	10.04	14.31	1280.
280.	.21704	1.2347	.0199	2767.5	3961.2	53.053	10.14	14.39	1324.
300.	.23230	1.3203	.0186	2973.2	4250.8	54.051	10.22	14.44	1366.
350.	.27015	1.5300	.0158	3489.3	4975.2	56.285	10.33	14.52	1467.
400.	.30789	1.7386	.0138	4008.3	5701.7	58.225	10.37	14.54	1561.
450.	.34556	1.9465	.0123	4528.4	6429.0	59.938	10.39	14.54	1651.
500.	.38318	2.1539	.0110	5048.9	7156.3	61.470	10.40	14.55	1736.
550.	.42077	2.3610	.0100	5569.6	7883.9	62.857	10.41	14.56	1817.
600.	.45834	2.5679	.0092	6091.3	8612.1	64.121	10.43	14.57	1894.
650.	.49589	2.7747	.0085	6613.6	9341.0	65.285	10.45	14.59	1968.
700.	.53344	2.9814	.0079	7137.3	10071.2	66.374	10.48	14.62	2039.
750.	.57097	3.1880	.0073	7663.0	10803.3	67.385	10.52	14.66	2107.
800.	.60850	3.3945	.0069	8190.7	11537.4	68.333	10.57	14.70	2173.
850.	.64602	3.6009	.0065	8721.1	12274.2	69.226	10.63	14.76	2236.
900.	.68353	3.8073	.0061	9254.6	13014.1	70.071	10.70	14.83	2297.
950.	.72105	4.0137	.0058	9791.5	13757.3	70.873	10.78	14.90	2356.
1000.	.75856	4.2201	.0055	10332.1	14504.2	71.638	10.86	14.99	2413.
1100.	.83357	4.6327	.0050	11427.9	16012.5	73.065	11.04	15.17	2523.
1200.	.90858	5.0453	.0046	12542.9	17540.1	74.387	11.24	15.37	2626.
1300.	.98358	5.4579	.0042	13678.7	19088.4	75.625	11.45	15.58	2725.
1400.	1.05858	5.8704	.0039	14835.9	20658.1	76.796	11.68	15.80	2819.
1500.	1.13358	6.2829	.0037	16014.9	22249.6	77.908	11.90	16.03	2909.
1600.	1.20858	6.6954	.0034	17214.8	23861.9	78.962	12.12	16.25	2996.
1700.	1.28358	7.1079	.0032	18436.6	25496.3	79.928	12.34	16.46	3080.
1800.	1.35859	7.5204	.0031	19681.0	27153.2	80.874	12.56	16.69	3161.
2000.	1.50871	8.3453	.0027	22241.3	30539.2	82.668	13.04	17.18	3315.
2200.	1.65916	9.1702	.0025	24906.8	34032.2	84.325	13.67	17.84	3459.
2400.	1.81046	9.9950	.0023	27728.1	37685.6	85.908	14.59	18.82	3590.
2600.	1.96359	10.8199	.0021	30786.9	41586.6	87.469	15.98	20.34	3710.
2800.	2.12019	11.6448	.0020	34206.0	45867.1	89.059	18.03	22.62	3821.
3000.	2.28270	12.4696	.0018	38150.7	50705.5	90.736	20.92	25.91	3928.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

5.50 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 15.531	79.8740	799.4	.24588	120.2324	.00801	92.81	288.89	.00065	1.26165	1.9922
16.	79.5707	802.2	.24351	117.7186	.00822	96.10	273.14	.00066	1.26058	1.8745
17.	78.8966	803.3	.23837	111.6002	.00873	101.57	244.51	.00066	1.25820	1.6877
18.	78.1927	803.4	.23314	105.6001	.00922	105.77	221.26	.00066	1.25572	1.5499
19.	77.4573	801.9	.22799	99.6413	.00972	108.68	202.02	.00065	1.25313	1.4493
20.	76.6916	802.3	.22291	94.3749	.01017	111.43	185.88	.00064	1.25043	1.3609
22.	75.0743	795.8	.21309	83.5812	.01116	116.87	160.40	.00063	1.24476	1.2191
24.	73.3357	782.4	.20436	73.1047	.01232	119.77	141.12	.00061	1.23867	1.1354
26.	71.4613	764.7	.19627	63.2538	.01363	120.71	125.88	.00058	1.23213	1.0870
28.	69.4364	742.2	.18813	53.8618	.01519	120.14	113.38	.00055	1.22509	1.0640
30.	67.2441	717.2	.18000	45.3116	.01696	118.41	102.78	.00052	1.21750	1.0558
32.	64.8709	690.0	.17165	37.5864	.01901	114.93	93.58	.00049	1.20932	1.0679
34.	62.3032	660.6	.16324	30.6693	.02145	110.91	85.42	.00045	1.20051	1.0913
36.	59.5192	630.2	.15449	24.6446	.02430	106.47	78.07	.00042	1.19101	1.1230
38.	56.5101	599.8	.14560	19.5375	.02758	101.69	71.40	.00039	1.18079	1.1613
40.	53.2888	570.5	.13696	15.3753	.03118	96.78	65.37	.00037	1.16992	1.2016
42.	49.8947	546.4	.12859	12.2203	.03460	92.68	60.01	.00035	1.15854	1.2241
44.	46.4150	528.2	.12072	9.8937	.03749	88.63	55.37	.00035	1.14695	1.2369
46.	42.9735	517.6	.11323	8.2561	.03937	84.84	51.51	.00035	1.13557	1.2372
48.	39.6930	514.1	.10715	7.1733	.03982	81.40	48.42	.00036	1.12479	1.2179
50.	36.6775	517.0	.10218	6.4766	.03898	78.42	46.05	.00038	1.11495	1.1833
55.	30.5594	546.3	.09342	5.7220	.03358	73.18	42.51	.00047	1.09515	1.0658
60.	26.2121	593.0	.08825	5.5318	.02795	70.63	41.04	.00059	1.08124	.9630
65.	23.0558	648.5	.08460	5.5044	.02360	70.10	40.62	.00072	1.07122	.8869
70.	20.6658	708.9	.08163	5.5288	.02035	70.33	40.81	.00085	1.06367	.8372
75.	18.7865	772.4	.07901	5.5634	.01790	70.39	41.38	.00098	1.05777	.8127
80.	17.2646	838.2	.07661	5.5983	.01599	71.47	42.20	.00111	1.05300	.7915
90.	14.9222	976.9	.07213	5.6564	.01323	76.25	44.24	.00142	1.04569	.7500
100.	13.2050	1123.1	.06804	5.6968	.01134	80.91	46.56	.00173	1.04036	.7326
110.	11.8817	1282.5	.06359	5.7171	.00993	85.37	47.86	.00203	1.03626	.7142
120.	10.8171	1441.7	.06042	5.7309	.00888	90.72	50.15	.00236	1.03298	.7080
140.	9.2034	1772.3	.05529	5.7418	.00737	102.01	54.86	.00305	1.02801	.7029
160.	8.0294	2110.8	.05156	5.7410	.00633	113.76	59.59	.00382	1.02440	.6999
180.	7.1318	2451.6	.04883	5.7348	.00556	125.55	64.23	.00465	1.02165	.6974
200.	6.4207	2790.7	.04682	5.7263	.00497	137.09	68.77	.00555	1.01948	.6953
220.	5.8421	3127.3	.04530	5.7168	.00449	148.23	73.21	.00650	1.01771	.6939
240.	5.3615	3458.7	.04417	5.7072	.00410	158.92	77.55	.00752	1.01625	.6927
260.	4.9554	3784.6	.04332	5.6979	.00378	169.17	81.78	.00859	1.01501	.6917
280.	4.6075	4104.9	.04268	5.6889	.00351	179.00	85.93	.00972	1.01395	.6908
300.	4.3047	4423.2	.04219	5.6836	.00327	188.44	89.99	.01091	1.01303	.6897
350.	3.7016	5189.5	.04145	5.6635	.00280	210.61	99.81	.01411	1.01120	.6879
400.	3.2479	5937.5	.04106	5.6468	.00245	231.22	109.20	.01763	1.00982	.6867
450.	2.8939	6675.2	.04083	5.6328	.00218	250.72	118.23	.02145	1.00875	.6858
500.	2.6097	7412.9	.04065	5.6211	.00196	269.44	126.95	.02554	1.00789	.6855
550.	2.3766	8149.1	.04050	5.6112	.00179	287.62	135.39	.02993	1.00718	.6852
600.	2.1818	8889.1	.04035	5.6027	.00164	305.44	143.60	.03459	1.00659	.6849
650.	2.0166	9633.1	.04020	5.5954	.00151	323.02	151.59	.03953	1.00609	.6846
700.	1.8746	10386.5	.04002	5.5890	.00141	340.46	159.38	.04473	1.00566	.6843
750.	1.7514	11148.4	.03982	5.5834	.00131	357.82	167.01	.05019	1.00529	.6840
800.	1.6434	11921.6	.03960	5.5784	.00123	375.16	174.48	.05589	1.00496	.6838
850.	1.5479	12707.8	.03934	5.5740	.00116	392.52	181.80	.06184	1.00467	.6837
900.	1.4630	13508.3	.03906	5.5701	.00110	409.93	189.00	.06803	1.00441	.6837
950.	1.3869	14324.1	.03876	5.5665	.00104	427.41	196.08	.07444	1.00418	.6837
1000.	1.3183	15155.6	.03843	5.5633	.00099	444.98	203.04	.08107	1.00398	.6839
1100.	1.1997	16855.6	.03776	5.5577	.00090	475.56	216.68	.09409	1.00362	.6911
1200.	1.1006	18614.2	.03705	5.5530	.00083	511.01	229.95	.10877	1.00332	.6915
1300.	1.0167	20430.8	.03634	5.5490	.00076	546.89	242.90	.12430	1.00307	.6919
1400.	.9447	22302.7	.03562	5.5456	.00071	583.19	255.56	.14066	1.00285	.6924
1500.	.8822	24226.0	.03492	5.5426	.00066	619.86	267.95	.15783	1.00266	.6928
1600.	.8274	26181.5	.03428	5.5399	.00062	656.50	280.10	.17582	1.00250	.6932
1700.	.7791	28181.0	.03366	5.5376	.00058	693.55	292.02	.19465	1.00235	.6933
1800.	.7361	30231.3	.03305	5.5354	.00055	731.39	303.71	.21436	1.00222	.6930
2000.	.6628	34554.3	.03181	5.5314	.00050	812.46	326.47	.25687	1.00200	.6903
2200.	.6027	39435.5	.03034	5.5270	.00045	910.70	344.91	.30495	1.00182	.6756
2400.	.5523	45338.2	.02844	5.5207	.00042	1044.10	366.30	.36160	1.00167	.6602
2600.	.5093	52974.1	.02600	5.5103	.00038	1239.52	387.34	.43086	1.00154	.6355
2800.	.4717	63257.3	.02310	5.4923	.00036	1531.14	408.22	.51659	1.00142	.6031
3000.	.4381	77216.8	.02001	5.4627	.00034	1957.49	429.24	.62075	1.00132	.5682

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

6.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 15.678	.01248	1.5352	.9665	221.7	296.6	14.218	4.92	6.40	1414.
16.	.01252	1.5184	.9702	223.6	298.7	14.350	4.98	6.54	1411.
17.	.01262	1.4521	.9773	229.7	305.4	14.759	5.17	6.95	1397.
18.	.01273	1.3891	.9784	236.2	312.6	15.167	5.33	7.34	1383.
19.	.01285	1.3275	.9746	243.0	320.1	15.575	5.48	7.72	1368.
20.	.01297	1.2678	.9665	250.2	328.0	15.980	5.61	8.09	1352.
22.	.01324	1.1548	.9421	265.4	344.9	16.786	5.83	8.79	1320.
24.	.01355	1.0404	.9107	281.9	363.2	17.582	6.00	9.52	1284.
26.	.01389	.9301	.8740	299.6	383.0	18.371	6.15	10.26	1246.
28.	.01427	.8223	.8318	318.6	404.3	19.160	6.26	11.06	1205.
30.	.01471	.7202	.7842	338.9	427.2	19.952	6.35	11.90	1161.
32.	.01522	.6260	.7325	360.6	451.9	20.748	6.42	12.78	1116.
34.	.01580	.5386	.6782	383.6	478.4	21.551	6.48	13.73	1068.
36.	.01648	.4609	.6222	407.9	506.8	22.364	6.52	14.74	1021.
38.	.01728	.3915	.5651	433.7	537.4	23.190	6.55	15.81	972.
40	.01822	.3333	.5082	460.8	570.1	24.028	6.57	16.86	925.
42	.01931	.2862	.4536	488.9	604.8	24.875	6.59	17.85	881.
44.	.02058	.2504	.4027	517.9	641.4	25.725	6.61	18.69	841.
46.	.02204	.2252	.3568	546.7	678.9	26.558	6.67	19.30	807.
48.	.02366	.2085	.3165	575.9	717.8	27.387	6.70	19.61	781.
50.	.02542	.2003	.2818	604.5	757.0	28.187	6.73	19.54	763.
55.	.03018	.2019	.2163	671.1	852.2	30.003	6.74	18.35	741.
60.	.03505	.2211	.1738	729.9	940.2	31.536	6.70	16.78	744.
65.	.03981	.2460	.1456	782.0	1020.8	32.826	6.68	15.55	757.
70.	.04442	.2737	.1256	829.7	1096.2	33.944	6.69	14.65	774.
75.	.04887	.3015	.1109	874.5	1167.8	34.932	6.72	14.03	793.
80.	.05321	.3291	.0994	917.5	1236.8	35.822	6.78	13.59	812.
90.	.06156	.3834	.0829	1000.3	1369.7	37.390	6.96	13.08	848.
100.	.06965	.4362	.0713	1081.4	1499.3	38.755	7.20	12.85	882.
110.	.07743	.4861	.0625	1164.0	1628.5	39.985	7.53	12.83	910.
120.	.08506	.5350	.0560	1246.6	1757.0	41.103	7.80	12.89	940.
140.	.09999	.6296	.0464	1416.8	2016.7	43.105	8.33	13.12	996.
160.	.11460	.7212	.0398	1594.2	2281.9	44.873	8.79	13.40	1049.
180.	.12901	.8107	.0349	1778.4	2552.5	46.467	9.16	13.66	1099.
200.	.14328	.8987	.0311	1968.3	2828.0	47.919	9.47	13.89	1148.
220.	.15745	.9856	.0281	2162.9	3107.6	49.251	9.71	14.07	1195.
240.	.17154	1.0718	.0256	2361.3	3390.5	50.482	9.90	14.21	1241.
260.	.18557	1.1573	.0235	2562.5	3675.9	51.625	10.04	14.32	1285.
280.	.19955	1.2423	.0218	2765.9	3963.2	52.689	10.15	14.40	1328.
300.	.21357	1.3282	.0203	2971.8	4253.2	53.688	10.22	14.45	1370.
350.	.24829	1.5381	.0173	3488.3	4978.0	55.923	10.33	14.52	1471.
400.	.28290	1.7469	.0151	4007.5	5704.9	57.864	10.37	14.54	1565.
450.	.31744	1.9548	.0134	4527.7	6432.4	59.577	10.39	14.55	1655.
500.	.35194	2.1623	.0120	5048.3	7159.9	61.110	10.40	14.55	1739.
550.	.38640	2.3695	.0109	5569.2	7887.6	62.497	10.41	14.56	1820.
600.	.42085	2.5765	.0100	6090.9	8615.9	63.762	10.43	14.57	1897.
650.	.45527	2.7833	.0092	6613.2	9344.9	64.925	10.45	14.59	1971.
700.	.48969	2.9900	.0086	7137.1	10075.2	66.015	10.48	14.62	2042.
750.	.52410	3.1966	.0080	7662.8	10807.4	67.026	10.52	14.66	2110.
800.	.55850	3.4031	.0075	8190.5	11541.5	67.974	10.57	14.70	2175.
850.	.59290	3.6095	.0071	8721.0	12278.3	68.867	10.63	14.76	2239.
900.	.62729	3.8160	.0067	9254.5	13018.2	69.711	10.70	14.83	2300.
950.	.66168	4.0224	.0063	9791.4	13761.4	70.514	10.78	14.90	2359.
1000.	.69606	4.2287	.0060	10332.0	14508.4	71.279	10.86	14.99	2416.
1100.	.76483	4.6414	.0055	11427.8	16016.8	72.706	11.04	15.17	2525.
1200.	.83359	5.0540	.0050	12542.9	17544.4	74.028	11.24	15.37	2628.
1300.	.90234	5.4666	.0046	13678.6	19092.7	75.266	11.45	15.58	2727.
1400.	.97109	5.8791	.0043	14835.8	20662.4	76.437	11.68	15.80	2821.
1500.	1.03984	6.2916	.0040	16014.8	22253.9	77.549	11.90	16.03	2911.
1600.	1.10859	6.7041	.0038	17214.7	23866.2	78.583	12.12	16.25	2998.
1700.	1.17734	7.1166	.0035	18436.5	25500.6	79.569	12.34	16.46	3082.
1800.	1.24610	7.5290	.0033	19680.8	27157.4	80.515	12.56	16.69	3163.
2000.	1.38370	8.3539	.0030	22240.3	30542.5	82.309	13.04	17.17	3317.
2200.	1.52160	9.1788	.0027	24903.3	34032.9	83.964	13.65	17.82	3461.
2400.	1.66024	10.0037	.0025	27718.2	37679.6	85.545	14.55	18.77	3593.
2600.	1.80049	10.8286	.0023	30762.9	41565.9	87.099	15.88	20.23	3713.
2800.	1.94379	11.6534	.0021	34155.0	45817.7	88.679	17.86	22.43	3825.
3000.	2.09227	12.4783	.0020	38052.4	50606.0	90.339	20.64	25.59	3932.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

6.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 15.678	80.1084	815.0	.24531	122.9816	.00786	94.40	291.98	.00066	1.26248	1.9809
16.	79.9026	817.4	.24368	121.3254	.00800	96.64	280.92	.00067	1.26176	1.9000
17.	79.2468	818.3	.23857	115.0744	.00849	102.24	251.31	.00067	1.25944	1.7084
18.	78.5592	819.2	.23347	109.1289	.00897	106.55	227.24	.00066	1.25701	1.5664
19.	77.8398	819.0	.22846	103.3346	.00943	109.56	207.34	.00066	1.25447	1.4618
20.	77.0922	818.0	.22351	97.7383	.00989	112.41	190.68	.00065	1.25184	1.3721
22.	75.5170	813.9	.21407	87.2047	.01080	118.06	164.45	.00064	1.24631	1.2247
24.	73.8252	802.5	.20543	76.8050	.01186	121.14	144.65	.00062	1.24038	1.1362
26.	72.0101	786.6	.19746	66.9741	.01305	122.28	129.09	.00060	1.23404	1.0836
28.	70.0607	766.3	.18952	57.6127	.01444	121.91	116.40	.00057	1.22726	1.0564
30.	67.9619	742.7	.18162	48.9441	.01602	120.41	105.70	.00054	1.21999	1.0447
32.	65.7014	717.4	.17355	41.1263	.01781	117.16	96.46	.00050	1.21218	1.0520
34.	63.2733	689.9	.16549	34.0776	.01990	113.40	88.31	.00047	1.20384	1.0693
36.	60.6643	662.3	.15728	27.9606	.02225	109.26	81.02	.00044	1.19491	1.0929
38.	57.8698	633.8	.14897	22.6546	.02494	104.81	74.43	.00041	1.18540	1.1228
40.	54.8979	606.9	.14089	18.2964	.02778	100.19	68.49	.00039	1.17534	1.1523
42.	51.7818	583.1	.13298	14.8206	.03061	95.95	63.18	.00037	1.16486	1.1751
44.	48.5797	564.4	.12542	12.1657	.03310	92.14	58.53	.00037	1.15415	1.1870
46.	45.3752	552.6	.11793	10.2169	.03492	88.50	54.57	.00036	1.14351	1.1901
48.	42.2687	546.1	.11168	8.8143	.03591	85.16	51.32	.00037	1.13325	1.1817
50.	39.3388	546.3	.10643	7.8782	.03577	82.18	48.71	.00038	1.12363	1.1584
55.	33.1336	567.6	.09684	6.6889	.03234	76.61	44.59	.00045	1.10345	1.0683
60.	28.5293	608.7	.09094	6.3073	.02756	73.56	42.71	.00055	1.08864	.9740
65.	25.1194	660.2	.08678	6.1803	.02355	72.61	42.01	.00067	1.07776	.8995
70.	22.5144	718.5	.08347	6.1615	.02039	72.51	41.98	.00079	1.06951	.8482
75.	20.4609	780.4	.08060	6.1681	.01797	72.27	42.37	.00091	1.06303	.8224
80.	18.7948	845.2	.07801	6.1862	.01608	73.16	43.05	.00103	1.05779	.7995
90.	16.2435	982.6	.07326	6.2279	.01331	77.71	44.89	.00132	1.04981	.7553
100.	14.3578	1128.7	.06898	6.2622	.01138	82.19	47.07	.00160	1.04394	.7358
110.	12.9156	1288.9	.06427	6.2787	.00996	86.50	48.33	.00188	1.03946	.7170
120.	11.7562	1448.3	.06100	6.2901	.00890	91.69	50.53	.00218	1.03588	.7101
140.	10.0012	1779.5	.05575	6.2970	.00737	102.73	55.14	.00282	1.03046	.7044
160.	8.7257	2118.7	.05193	6.2927	.00633	114.31	59.79	.00352	1.02654	.7011
180.	7.7511	2460.2	.04914	6.2834	.00555	125.98	64.39	.00428	1.02355	.6985
200.	6.9792	2800.1	.04708	6.2720	.00496	137.43	68.91	.00510	1.02119	.6963
220.	6.3512	3137.4	.04553	6.2600	.00449	148.51	73.32	.00598	1.01927	.6947
240.	5.8296	3469.3	.04437	6.2480	.00410	159.16	77.64	.00691	1.01768	.6934
260.	5.3888	3795.9	.04350	6.2364	.00377	169.37	81.87	.00790	1.01633	.6923
280.	5.0112	4116.7	.04284	6.2255	.00350	179.17	86.01	.00894	1.01518	.6914
300.	4.6823	4435.8	.04234	6.2192	.00326	188.59	90.06	.01003	1.01418	.6902
350.	4.0275	5202.9	.04157	6.1949	.00279	210.73	99.86	.01297	1.01219	.6882
400.	3.5348	5951.3	.04116	6.1748	.00244	231.31	109.24	.01620	1.01069	.6869
450.	3.1502	6689.4	.04093	6.1581	.00217	250.79	118.27	.01970	1.00952	.6860
500.	2.8414	7427.3	.04073	6.1441	.00196	269.50	126.98	.02346	1.00859	.6857
550.	2.5880	8163.7	.04058	6.1323	.00178	287.68	135.42	.02749	1.00782	.6853
600.	2.3762	8903.8	.04042	6.1222	.00164	305.49	143.62	.03176	1.00718	.6850
650.	2.1965	9648.0	.04027	6.1134	.00151	323.06	151.61	.03629	1.00663	.6846
700.	2.0421	10401.4	.04008	6.1058	.00141	340.50	159.40	.04106	1.00617	.6844
750.	1.9080	11163.5	.03988	6.0991	.00131	357.85	167.03	.04607	1.00576	.6841
800.	1.7905	11936.8	.03965	6.0932	.00123	375.19	174.49	.05130	1.00541	.6839
850.	1.6866	12723.2	.03939	6.0880	.00116	392.55	181.82	.05676	1.00509	.6837
900.	1.5942	13523.8	.03911	6.0833	.00110	409.95	189.01	.06243	1.00481	.6837
950.	1.5113	14339.6	.03880	6.0790	.00104	427.43	196.09	.06831	1.00456	.6838
1000.	1.4367	15171.3	.03847	6.0752	.00099	445.00	203.06	.07440	1.00434	.6839
1100.	1.3075	16871.4	.03779	6.0685	.00090	475.56	216.69	.08633	1.00394	.6911
1200.	1.1996	18630.4	.03709	6.0630	.00082	511.01	229.96	.09979	1.00362	.6915
1300.	1.1082	20447.2	.03637	6.0582	.00076	546.89	242.90	.11403	1.00334	.6920
1400.	1.0298	22319.3	.03565	6.0541	.00071	583.19	255.57	.12903	1.00311	.6924
1500.	.9617	24242.7	.03495	6.0505	.00066	619.85	267.96	.14477	1.00290	.6929
1600.	.9020	26198.0	.03430	6.0474	.00062	656.48	280.11	.16127	1.00272	.6932
1700.	.8494	28196.8	.03368	6.0446	.00058	693.49	292.02	.17853	1.00256	.6933
1800.	.8025	30245.4	.03307	6.0421	.00055	731.25	303.72	.19659	1.00242	.6930
2000.	.7227	34558.1	.03184	6.0374	.00050	811.91	326.47	.23553	1.00218	.6905
2200.	.6572	39409.0	.03039	6.0324	.00045	908.97	344.91	.27947	1.00198	.6760
2400.	.6023	45240.4	.02853	6.0255	.00041	1039.66	366.30	.33106	1.00182	.6613
2600.	.5554	52733.7	.02616	6.0142	.00038	1229.67	387.32	.39393	1.00167	.6373
2800.	.5145	62765.1	.02333	5.9952	.00036	1511.81	408.18	.47158	1.00155	.6057
3000.	.4780	76323.3	.02028	5.9640	.00034	1923.06	429.15	.56595	1.00144	.5712

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

6.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 15.824	.01245	1.5643	.9704	222.1	303.0	14.229	4.93	6.41	1425.
16.	.01246	1.5552	.9725	223.1	304.1	14.301	4.97	6.48	1424.
17.	.01256	1.4887	.9806	229.1	310.8	14.706	5.16	6.89	1410.
18.	.01267	1.4272	.9827	235.5	317.9	15.112	5.33	7.28	1397.
19.	.01279	1.3657	.9799	242.3	325.4	15.515	5.47	7.66	1382.
20.	.01291	1.3039	.9731	249.3	333.2	15.917	5.60	8.02	1366.
22.	.01317	1.1986	.9502	264.3	349.9	16.716	5.82	8.70	1338.
24.	.01346	1.0814	.9205	280.6	368.0	17.503	6.00	9.41	1302.
26.	.01379	.9720	.8852	298.0	387.6	18.283	6.15	10.13	1266.
28.	.01415	.8668	.8446	316.6	408.6	19.060	6.27	10.88	1227.
30.	.01457	.7654	.7990	336.4	431.1	19.838	6.36	11.67	1185.
32.	.01504	.6698	.7492	357.5	455.3	20.617	6.43	12.50	1141.
34.	.01559	.5840	.6969	379.8	481.1	21.400	6.49	13.35	1097.
36.	.01621	.5065	.6434	403.4	508.7	22.189	6.53	14.26	1052.
38.	.01693	.4363	.5887	428.2	538.2	22.986	6.56	15.21	1006.
40.	.01776	.3762	.5342	454.1	569.5	23.790	6.58	16.15	961.
42.	.01872	.3266	.4813	481.0	602.7	24.598	6.59	17.03	919.
44.	.01983	.2884	.4316	508.7	637.6	25.409	6.61	17.78	881.
46.	.02108	.2593	.3860	536.3	673.3	26.202	6.66	18.41	846.
48.	.02247	.2391	.3452	564.5	710.5	26.994	6.70	18.78	819.
50.	.02399	.2264	.3095	592.3	748.2	27.764	6.73	18.90	798.
55.	.02816	.2197	.2401	658.4	841.5	29.543	6.75	18.20	770.
60.	.03254	.2336	.1933	718.0	929.5	31.076	6.72	16.87	766.
65.	.03688	.2554	.1615	771.1	1010.8	32.377	6.69	15.72	775.
70.	.04112	.2812	.1390	819.8	1087.1	33.509	6.70	14.84	789.
75.	.04524	.3079	.1224	865.5	1159.6	34.509	6.74	14.20	806.
80.	.04926	.3351	.1095	909.2	1229.4	35.411	6.79	13.75	823.
90.	.05702	.3888	.0910	993.2	1363.8	36.995	6.98	13.21	858.
100.	.06450	.4411	.0781	1075.2	1494.4	38.371	7.21	12.97	891.
110.	.07174	.4914	.0683	1158.6	1624.9	39.614	7.55	12.92	917.
120.	.07883	.5406	.0611	1241.8	1754.2	40.739	7.82	12.96	947.
140.	.09266	.6356	.0506	1412.8	2015.2	42.750	8.34	13.18	1002.
160.	.10620	.7275	.0433	1590.9	2281.2	44.525	8.79	13.44	1055.
180.	.11954	.8173	.0379	1775.5	2552.6	46.123	9.17	13.70	1105.
200.	.13274	.9056	.0338	1965.8	2828.6	47.577	9.47	13.91	1153.
220.	.14584	.9928	.0305	2160.7	3108.7	48.912	9.71	14.09	1200.
240.	.15887	1.0791	.0278	2359.3	3392.0	50.144	9.90	14.23	1245.
260.	.17184	1.1648	.0255	2560.8	3677.7	51.288	10.04	14.34	1290.
280.	.18476	1.2500	.0236	2764.3	3965.3	52.354	10.15	14.42	1332.
300.	.19772	1.3362	.0220	2970.4	4255.6	53.353	10.23	14.46	1375.
350.	.22979	1.5463	.0187	3487.2	4980.9	55.590	10.33	14.53	1475.
400.	.26175	1.7552	.0164	4006.6	5708.0	57.532	10.37	14.55	1569.
450.	.29365	1.9632	.0145	4527.1	6435.8	59.246	10.39	14.55	1658.
500.	.32550	2.1708	.0130	5047.8	7163.5	60.779	10.40	14.56	1743.
550.	.35732	2.3780	.0118	5568.7	7891.3	62.166	10.41	14.56	1823.
600.	.38912	2.5850	.0109	6090.5	8619.8	63.431	10.43	14.57	1900.
650.	.42090	2.7918	.0100	6612.9	9348.8	64.595	10.45	14.59	1974.
700.	.45268	2.9985	.0093	7136.8	10079.2	65.684	10.49	14.62	2045.
750.	.48444	3.2051	.0087	7662.5	10811.4	66.696	10.52	14.66	2113.
800.	.51620	3.4117	.0081	8190.3	11545.6	67.644	10.57	14.70	2178.
850.	.54795	3.6182	.0077	8720.8	12282.4	68.537	10.63	14.76	2241.
900.	.57970	3.8246	.0072	9254.3	13022.3	69.381	10.70	14.83	2302.
950.	.61144	4.0310	.0068	9791.2	13765.6	70.184	10.78	14.90	2361.
1000.	.64318	4.2374	.0065	10331.9	14512.6	70.949	10.86	14.99	2418.
1100.	.70666	4.6500	.0059	11427.7	16021.0	72.376	11.04	15.17	2527.
1200.	.77013	5.0626	.0054	12542.8	17548.7	73.698	11.24	15.37	2631.
1300.	.83360	5.4752	.0050	13678.6	19097.0	74.936	11.45	15.58	2729.
1400.	.89706	5.8877	.0046	14835.8	20666.7	76.107	11.68	15.80	2823.
1500.	.96052	6.3002	.0043	16014.8	22258.2	77.219	11.90	16.03	2913.
1600.	1.02398	6.7127	.0041	17214.7	23870.5	78.253	12.12	16.25	3000.
1700.	1.08744	7.1252	.0038	18436.5	25504.9	79.239	12.34	16.46	3083.
1800.	1.15092	7.5377	.0036	19680.6	27161.5	80.185	12.56	16.68	3165.
2000.	1.27793	8.3626	.0032	22239.4	30546.0	81.978	13.03	17.17	3319.
2200.	1.40520	9.1875	.0030	24900.2	34034.0	83.632	13.64	17.80	3463.
2400.	1.53314	10.0123	.0027	27709.4	37674.8	85.210	14.51	18.73	3595.
2600.	1.66250	10.8372	.0025	30741.8	41548.1	86.760	15.80	20.14	3716.
2800.	1.79457	11.6620	.0023	34110.0	45774.7	88.330	17.71	22.27	3828.
3000.	1.93124	12.4869	.0022	37965.6	50518.7	89.975	20.39	25.31	3935.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

6.50 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 15.824	80.3392	830.2	.24479	125.6713	.00772	95.96	295.07	.00067	1.26330	1.9712
16.	80.2292	831.6	.24389	124.7693	.00779	97.18	288.91	.00067	1.26291	1.9271
17.	79.5880	832.8	.23881	118.4854	.00828	102.90	258.23	.00068	1.26064	1.7298
18.	78.9115	834.6	.23378	112.6205	.00873	107.31	233.24	.00067	1.25825	1.5830
19.	78.2113	834.8	.22884	106.8102	.00917	110.43	212.73	.00066	1.25578	1.4754
20.	77.4801	833.0	.22410	101.0239	.00963	113.36	195.52	.00066	1.25321	1.3840
22.	75.9368	833.2	.21485	91.0190	.01044	119.19	168.45	.00065	1.24778	1.2292
24.	74.2976	821.3	.20641	80.3462	.01146	122.48	148.20	.00063	1.24204	1.1385
26.	72.5377	806.8	.19857	70.5049	.01256	123.80	132.30	.00061	1.23588	1.0825
28.	70.6511	789.1	.19079	61.2431	.01379	123.61	119.37	.00058	1.22931	1.0509
30.	68.6355	767.3	.18310	52.5322	.01521	122.32	108.56	.00055	1.22232	1.0357
32.	66.4738	742.8	.17526	44.5225	.01683	119.28	99.25	.00052	1.21485	1.0402
34.	64.1640	718.0	.16746	37.4726	.01860	115.74	91.09	.00049	1.20689	1.0511
36.	61.6996	692.6	.15968	31.2485	.02059	111.84	83.82	.00046	1.19845	1.0688
38.	59.0790	666.0	.15182	25.7762	.02284	107.67	77.29	.00043	1.18951	1.0920
40.	56.3088	640.3	.14423	21.1855	.02522	103.33	71.40	.00041	1.18011	1.1157
42.	53.4161	617.3	.13672	17.4452	.02759	98.95	66.13	.00039	1.17035	1.1383
44.	50.4402	599.3	.12945	14.5475	.02967	95.33	61.48	.00038	1.16037	1.1465
46.	47.4457	586.6	.12210	12.3030	.03138	91.84	57.46	.00038	1.15038	1.1514
48.	44.5052	578.9	.11578	10.6418	.03244	88.59	54.07	.00038	1.14063	1.1463
50.	41.6889	576.4	.11036	9.4380	.03280	85.65	51.30	.00039	1.13134	1.1322
55.	35.5085	591.2	.10016	7.8008	.03078	79.88	46.66	.00044	1.11114	1.0630
60.	30.7314	626.8	.09365	7.1783	.02692	76.43	44.36	.00053	1.09571	.9794
65.	27.1136	674.2	.08899	6.9255	.02332	75.11	43.39	.00063	1.08412	.9083
70.	24.3179	729.8	.08532	6.8381	.02033	74.70	43.16	.00075	1.07522	.8574
75.	22.1020	789.8	.08220	6.8042	.01799	74.17	43.39	.00085	1.06820	.8309
80.	20.3013	853.7	.07941	6.8037	.01610	74.87	43.93	.00097	1.06253	.8065
90.	17.5383	989.7	.07438	6.8189	.01334	79.18	45.56	.00123	1.05386	.7600
100.	15.5036	1134.8	.06995	6.8394	.01143	83.49	47.61	.00150	1.04750	.7394
110.	13.9386	1295.9	.06494	6.8501	.00997	87.67	48.82	.00175	1.04264	.7197
120.	12.6860	1455.4	.06159	6.8578	.00890	92.69	50.93	.00203	1.03875	.7121
140.	10.7916	1787.1	.05620	6.8590	.00737	103.47	55.42	.00262	1.03290	.7058
160.	9.4161	2126.9	.05229	6.8503	.00632	114.87	60.01	.00327	1.02866	.7023
180.	8.3653	2469.1	.04944	6.8371	.00555	126.42	64.57	.00397	1.02543	.6995
200.	7.5334	2809.7	.04734	6.8223	.00495	137.78	69.05	.00473	1.02288	.6972
220.	6.8567	3147.6	.04576	6.8073	.00448	148.80	73.44	.00554	1.02081	.6956
240.	6.2945	3480.2	.04457	6.7926	.00409	159.40	77.75	.00641	1.01909	.6941
260.	5.8195	3807.2	.04368	6.7786	.00377	169.58	81.96	.00732	1.01764	.6930
280.	5.4125	4128.5	.04301	6.7654	.00349	179.35	86.08	.00828	1.01640	.6919
300.	5.0576	4448.6	.04249	6.7581	.00325	188.75	90.13	.00929	1.01532	.6907
350.	4.3518	5216.3	.04170	6.7292	.00279	210.85	99.91	.01200	1.01317	.6886
400.	3.8204	5965.2	.04127	6.7054	.00244	231.41	109.29	.01499	1.01156	.6872
450.	3.4054	6703.6	.04102	6.6856	.00217	250.87	118.30	.01823	1.01030	.6862
500.	3.0722	7441.8	.04081	6.6691	.00196	269.57	127.01	.02170	1.00929	.6858
550.	2.7986	8178.3	.04065	6.6552	.00178	287.73	135.45	.02542	1.00846	.6854
600.	2.5699	8918.6	.04049	6.6433	.00163	305.54	143.64	.02937	1.00776	.6851
650.	2.3758	9662.9	.04033	6.6330	.00151	323.11	151.63	.03355	1.00718	.6847
700.	2.2091	10416.4	.04014	6.6240	.00140	340.54	159.42	.03796	1.00667	.6844
750.	2.0642	11178.5	.03993	6.6162	.00131	357.89	167.04	.04258	1.00623	.6841
800.	1.9372	11952.0	.03970	6.6093	.00123	375.22	174.51	.04742	1.00585	.6839
850.	1.8250	12738.5	.03944	6.6031	.00116	392.58	181.83	.05246	1.00551	.6837
900.	1.7250	13539.2	.03915	6.5976	.00110	409.98	189.03	.05770	1.00521	.6837
950.	1.6355	14355.1	.03884	6.5926	.00104	427.46	196.10	.06313	1.00494	.6838
1000.	1.5548	15186.9	.03851	6.5881	.00099	445.03	203.07	.06875	1.00469	.6840
1100.	1.4151	16887.3	.03783	6.5803	.00090	475.56	216.70	.07976	1.00427	.6912
1200.	1.2985	18646.5	.03712	6.5737	.00082	511.01	229.96	.09219	1.00392	.6916
1300.	1.1996	20463.5	.03639	6.5682	.00076	546.89	242.91	.10534	1.00362	.6920
1400.	1.1148	22335.8	.03567	6.5634	.00071	583.19	255.57	.11919	1.00336	.6925
1500.	1.0411	24259.4	.03497	6.5592	.00066	619.84	267.97	.13373	1.00314	.6929
1600.	.9766	26214.6	.03432	6.5555	.00062	656.46	280.12	.14896	1.00295	.6932
1700.	.9196	28212.8	.03370	6.5522	.00058	693.44	292.03	.16489	1.00277	.6933
1800.	.8689	30259.9	.03310	6.5493	.00055	731.13	303.72	.18156	1.00262	.6931
2000.	.7825	34563.5	.03188	6.5439	.00050	811.42	326.48	.21747	1.00236	.6907
2200.	.7116	39387.7	.03044	6.5382	.00045	907.45	344.91	.25792	1.00215	.6765
2400.	.6523	45156.4	.02862	6.5306	.00041	1035.73	366.29	.30527	1.00197	.6623
2600.	.6015	52523.8	.02630	6.5186	.00038	1220.98	387.30	.35279	1.00181	.6389
2800.	.5572	62333.1	.02353	6.4985	.00036	1494.74	408.14	.43370	1.00168	.6080
3000.	.5178	75536.8	.02052	6.4658	.00034	1892.66	429.08	.51988	1.00156	.5738

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

7.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 15.968	.01241	1.5924	.9744	222.5	309.4	14.240	4.95	6.42	1437.
16.	.01242	1.5910	.9748	222.7	309.6	14.253	4.96	6.43	1437.
17.	.01251	1.5282	.9838	228.6	316.2	14.656	5.15	6.84	1424.
18.	.01262	1.4642	.9869	234.9	323.2	15.057	5.32	7.22	1410.
19.	.01273	1.4027	.9850	241.6	330.7	15.457	5.47	7.60	1396.
20.	.01284	1.3450	.9792	248.5	338.4	15.856	5.60	7.95	1382.
22.	.01310	1.2395	.9580	263.3	355.0	16.648	5.82	8.62	1354.
24.	.01338	1.1240	.9297	279.3	372.9	17.428	6.00	9.30	1320.
26.	.01369	1.0143	.8957	296.4	392.2	18.198	6.15	10.00	1285.
28.	.01404	.9094	.8568	314.7	413.0	18.965	6.27	10.72	1247.
30.	.01444	.8083	.8129	334.1	435.1	19.730	6.36	11.47	1207.
32.	.01488	.7147	.7650	354.7	458.8	20.495	6.44	12.24	1166.
34.	.01539	.6287	.7144	376.4	484.1	21.261	6.50	13.03	1123.
36.	.01596	.5506	.6628	399.3	511.0	22.029	6.54	13.86	1080.
38.	.01662	.4800	.6104	423.2	539.6	22.802	6.57	14.72	1037.
40.	.01737	.4194	.5579	448.3	569.9	23.578	6.59	15.55	995.
42.	.01823	.3681	.5067	474.2	601.8	24.356	6.60	16.33	955.
44.	.01920	.3261	.4581	500.7	635.2	25.132	6.61	17.05	917.
46.	.02030	.2935	.4130	527.3	669.4	25.892	6.67	17.68	882.
48.	.02152	.2706	.3721	554.5	705.1	26.653	6.70	18.07	854.
50.	.02285	.2544	.3357	581.6	741.5	27.396	6.73	18.28	831.
55.	.02653	.2394	.2633	646.9	832.6	29.133	6.76	17.97	798.
60.	.03048	.2480	.2127	706.8	920.1	30.658	6.73	16.89	789.
65.	.03445	.2667	.1776	760.7	1001.8	31.965	6.71	15.83	793.
70.	.03836	.2901	.1526	810.3	1078.8	33.106	6.71	14.99	805.
75.	.04218	.3157	.1341	856.7	1152.0	34.117	6.75	14.35	819.
80.	.04592	.3420	.1198	901.1	1222.6	35.028	6.81	13.89	835.
90.	.05315	.3949	.0992	986.2	1358.3	36.628	6.99	13.33	868.
100.	.06013	.4469	.0850	1069.0	1490.0	38.015	7.22	13.07	900.
110.	.06689	.4971	.0746	1153.3	1621.5	39.267	7.56	13.06	927.
120.	.07350	.5464	.0662	1237.1	1751.6	40.400	7.83	13.03	954.
140.	.08640	.6418	.0547	1408.9	2013.7	42.420	8.35	13.23	1008.
160.	.09901	.7340	.0468	1587.6	2280.7	44.201	8.80	13.48	1060.
180.	.11143	.8241	.0410	1772.7	2552.7	45.803	9.18	13.73	1110.
200.	.12371	.9126	.0365	1963.3	2829.3	47.260	9.48	13.94	1158.
220.	.13590	1.0000	.0329	2158.5	3109.8	48.597	9.72	14.11	1205.
240.	.14801	1.0865	.0300	2357.4	3393.4	49.831	9.91	14.25	1250.
260.	.16007	1.1724	.0275	2559.0	3679.5	50.976	10.05	14.35	1294.
280.	.17208	1.2577	.0255	2762.8	3967.3	52.043	10.15	14.43	1337.
300.	.18414	1.3443	.0237	2969.1	4258.1	53.043	10.23	14.48	1379.
350.	.21394	1.5545	.0202	3486.2	4983.8	55.281	10.33	14.54	1479.
400.	.24363	1.7635	.0176	4005.8	5711.2	57.225	10.38	14.56	1573.
450.	.27326	1.9716	.0156	4526.4	6439.2	58.939	10.39	14.55	1662.
500.	.30284	2.1793	.0141	5047.2	7167.1	60.472	10.40	14.56	1746.
550.	.33239	2.3865	.0128	5568.3	7895.0	61.860	10.42	14.56	1827.
600.	.36192	2.5936	.0117	6090.1	8623.6	63.125	10.43	14.57	1903.
650.	.39144	2.8004	.0108	6612.6	9352.7	64.288	10.45	14.59	1977.
700.	.42095	3.0071	.0100	7136.5	10083.1	65.378	10.49	14.62	2048.
750.	.45044	3.2137	.0093	7662.3	10815.4	66.390	10.53	14.66	2116.
800.	.47993	3.4203	.0088	8190.1	11549.6	67.338	10.57	14.71	2181.
850.	.50942	3.6268	.0082	8720.6	12286.5	68.231	10.63	14.76	2244.
900.	.53890	3.8332	.0078	9254.2	13026.5	69.075	10.70	14.83	2305.
950.	.56838	4.0396	.0074	9791.1	13769.8	69.878	10.78	14.91	2364.
1000.	.59785	4.2460	.0070	10331.8	14516.8	70.643	10.86	14.99	2421.
1100.	.65680	4.6587	.0064	11427.6	16025.2	72.070	11.04	15.17	2530.
1200.	.71574	5.0713	.0058	12542.7	17552.9	73.392	11.24	15.37	2633.
1300.	.77467	5.4838	.0054	13678.5	19101.2	74.631	11.45	15.58	2731.
1400.	.83360	5.8964	.0050	14835.8	20671.0	75.801	11.68	15.80	2825.
1500.	.89253	6.3089	.0047	16014.8	22262.5	76.913	11.90	16.03	2915.
1600.	.95146	6.7213	.0044	17214.6	23874.8	77.947	12.12	16.25	3001.
1700.	1.01039	7.1338	.0041	18436.4	25509.1	78.933	12.34	16.46	3085.
1800.	1.06933	7.5463	.0039	19680.4	27165.7	79.879	12.56	16.68	3166.
2000.	1.18726	8.3712	.0035	22238.7	30549.5	81.672	13.02	17.16	3321.
2200.	1.30543	9.1961	.0032	24897.5	34035.5	83.325	13.62	17.78	3465.
2400.	1.42420	10.0209	.0029	27701.6	37671.0	84.901	14.47	18.69	3597.
2600.	1.54424	10.8458	.0027	30723.0	41532.7	86.446	15.73	20.06	3719.
2800.	1.66670	11.6706	.0025	34069.9	45736.9	88.008	17.57	22.12	3831.
3000.	1.79328	12.4955	.0023	37888.4	50441.4	89.639	20.17	25.06	3938.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

7.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 15.968	80.5666	844.9	.24430	128.2933	.00760	97.48	298.16	.00068	1.26411	1.9629
16.	80.5475	845.3	.24413	128.1504	.00761	97.70	297.03	.00068	1.26404	1.9549
17.	79.9143	848.5	.23909	122.1251	.00806	103.53	265.12	.00068	1.26180	1.7503
18.	79.2588	849.6	.23410	116.0489	.00850	108.06	239.40	.00068	1.25948	1.6006
19.	78.5724	850.1	.22924	110.2150	.00894	111.27	218.17	.00067	1.25706	1.4897
20.	77.8601	850.4	.22459	104.7199	.00935	114.31	200.45	.00066	1.25455	1.3945
22.	76.3500	851.1	.21557	94.6381	.01012	120.32	172.53	.00066	1.24923	1.2355
24.	74.7481	840.7	.20730	84.0149	.01107	123.77	151.72	.00064	1.24361	1.1404
26.	73.0392	827.1	.19956	74.0861	.01209	125.26	135.47	.00062	1.23764	1.0815
28.	71.2161	810.7	.19194	64.7641	.01323	125.26	122.32	.00059	1.23128	1.0473
30.	69.2709	790.3	.18445	55.9936	.01452	124.15	111.36	.00056	1.22452	1.0292
32.	67.1955	768.5	.17683	48.0249	.01593	121.29	101.97	.00053	1.21734	1.0291
34.	64.9888	745.2	.16925	40.8590	.01749	117.94	93.78	.00050	1.20973	1.0361
36.	62.6474	721.3	.16175	34.4949	.01921	114.26	86.51	.00047	1.20169	1.0493
38.	60.1709	696.5	.15431	28.8802	.02113	110.31	80.00	.00045	1.19323	1.0675
40.	57.5659	672.8	.14712	24.1448	.02311	106.22	74.14	.00043	1.18437	1.0851
42.	54.8551	650.9	.13999	20.1923	.02509	102.05	68.90	.00041	1.17520	1.1027
44.	52.0711	632.3	.13299	16.9828	.02697	98.27	64.24	.00040	1.16583	1.1149
46.	49.2584	619.0	.12577	14.4590	.02856	94.94	60.18	.00039	1.15642	1.1208
48.	46.4718	610.8	.11947	12.5758	.02958	91.76	56.70	.00039	1.14714	1.1165
50.	43.7729	606.7	.11397	11.1370	.03014	88.86	53.79	.00040	1.13821	1.1068
55.	37.6913	615.8	.10332	9.0234	.02917	82.99	48.72	.00044	1.11825	1.0547
60.	32.8099	646.4	.09632	8.1382	.02613	79.22	45.02	.00051	1.10241	.9813
65.	29.0283	690.1	.09122	7.7421	.02294	77.57	44.77	.00061	1.09024	.9139
70.	26.0692	742.6	.08720	7.5635	.02018	76.87	44.34	.00071	1.08079	.8646
75.	23.7060	800.9	.08383	7.4838	.01792	76.08	44.42	.00081	1.07328	.8379
80.	21.7779	863.3	.08084	7.4491	.01609	76.58	44.82	.00091	1.06718	.8129
90.	18.8139	997.8	.07550	7.4304	.01336	80.65	46.26	.00116	1.05785	.7644
100.	16.6298	1142.1	.07086	7.4325	.01144	84.78	48.17	.00140	1.05102	.7424
110.	14.9503	1302.1	.06597	7.4318	.01003	88.87	49.34	.00164	1.04578	.7253
120.	13.6060	1463.0	.06216	7.4343	.00891	93.71	51.35	.00190	1.04160	.7140
140.	11.5745	1795.0	.05665	7.4281	.00737	104.23	55.72	.00245	1.03531	.7072
160.	10.1003	2135.4	.05266	7.4137	.00631	115.45	60.24	.00305	1.03077	.7034
180.	8.9746	2478.3	.04975	7.3960	.00554	126.87	64.75	.00371	1.02730	.7005
200.	8.0834	2819.5	.04760	7.3773	.00494	138.15	69.20	.00441	1.02457	.6981
220.	7.3585	3158.0	.04598	7.3588	.00447	149.10	73.57	.00517	1.02235	.6964
240.	6.7563	3491.1	.04477	7.3410	.00408	159.65	77.85	.00597	1.02051	.6949
260.	6.2474	3818.7	.04386	7.3243	.00376	169.79	82.05	.00682	1.01895	.6936
280.	5.8112	4140.4	.04317	7.3087	.00348	179.53	86.17	.00771	1.01762	.6925
300.	5.4307	4461.4	.04264	7.3002	.00324	188.91	90.20	.00865	1.01646	.6912
350.	4.6743	5229.8	.04182	7.2663	.00278	210.97	99.97	.01118	1.01415	.6889
400.	4.1046	5979.2	.04138	7.2384	.00243	231.50	109.33	.01395	1.01242	.6874
450.	3.6596	6717.8	.04111	7.2154	.00217	250.95	118.34	.01696	1.01107	.6864
500.	3.3021	7456.3	.04090	7.1961	.00195	269.63	127.04	.02019	1.00998	.6860
550.	3.0085	8193.0	.04073	7.1799	.00178	287.79	135.48	.02365	1.00909	.6856
600.	2.7630	8933.4	.04056	7.1661	.00163	305.59	143.67	.02732	1.00835	.6852
650.	2.5547	9677.8	.04039	7.1541	.00151	323.15	151.65	.03121	1.00772	.6848
700.	2.3756	10431.4	.04020	7.1437	.00140	340.58	159.44	.03530	1.00718	.6845
750.	2.2200	11193.7	.03999	7.1346	.00131	357.93	167.06	.03960	1.00670	.6842
800.	2.0836	11967.2	.03975	7.1266	.00123	375.26	174.53	.04409	1.00629	.6839
850.	1.9630	12753.8	.03948	7.1194	.00116	392.61	181.85	.04877	1.00593	.6838
900.	1.8556	13554.6	.03919	7.1130	.00109	410.01	189.04	.05364	1.00560	.6837
950.	1.7594	14370.7	.03888	7.1072	.00104	427.49	196.12	.05868	1.00531	.6838
1000.	1.6726	15202.5	.03854	7.1020	.00099	445.05	203.08	.06390	1.00505	.6840
1100.	1.5225	16903.2	.03786	7.0930	.00090	475.56	216.71	.07413	1.00459	.6912
1200.	1.3972	18662.6	.03715	7.0854	.00082	511.01	229.97	.08568	1.00422	.6916
1300.	1.2909	20479.9	.03642	7.0789	.00076	546.89	242.92	.09790	1.00389	.6920
1400.	1.1996	22352.4	.03570	7.0733	.00071	583.19	255.58	.11076	1.00362	.6925
1500.	1.1204	24276.1	.03500	7.0685	.00066	619.84	267.97	.12426	1.00338	.6929
1600.	1.0510	26231.2	.03434	7.0643	.00062	656.44	280.12	.13841	1.00317	.6932
1700.	.9897	28229.0	.03372	7.0605	.00058	693.39	292.04	.15320	1.00299	.6934
1800.	.9352	30274.7	.03312	7.0570	.00055	731.02	303.73	.16868	1.00282	.6931
2000.	.8423	34570.3	.03190	7.0508	.00050	810.99	326.48	.20200	1.00254	.6908
2200.	.7660	39370.8	.03049	7.0445	.00045	906.09	344.90	.23947	1.00231	.6769
2400.	.7022	45083.5	.02870	7.0362	.00041	1032.24	366.29	.28321	1.00212	.6631
2600.	.6476	52338.9	.02643	7.0234	.00038	1213.24	387.29	.33619	1.00195	.6404
2800.	.6000	61950.2	.02371	7.0022	.00036	1479.53	408.11	.40139	1.00181	.6101
3000.	.5576	74837.9	.02075	6.9679	.00033	1865.56	429.01	.48061	1.00168	.5763

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

7.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 16.111	.01238	1.6146	1.006	222.9	315.7	14.247	4.97	6.52	1455.
17.	.01246	1.5650	.9870	228.1	321.6	14.606	5.14	6.78	1437.
18.	.01256	1.5002	.9910	234.4	328.6	15.004	5.31	7.17	1423.
19.	.01267	1.4417	.9899	240.9	335.9	15.401	5.46	7.54	1410.
20.	.01278	1.3818	.9849	247.8	343.6	15.797	5.60	7.89	1396.
22.	.01303	1.2728	.9655	262.4	360.1	16.583	5.82	8.55	1368.
24.	.01330	1.1644	.9385	278.1	377.9	17.355	6.00	9.21	1337.
26.	.01360	1.0541	.9058	294.9	397.0	18.117	6.14	9.89	1302.
28.	.01394	.9521	.8682	312.9	417.4	18.874	6.27	10.57	1267.
30.	.01431	.8524	.8260	331.9	439.3	19.628	6.37	11.29	1229.
32.	.01473	.7585	.7798	352.1	462.6	20.380	6.44	12.01	1189.
34.	.01521	.6724	.7309	373.3	487.3	21.131	6.50	12.75	1148.
36.	.01574	.5936	.6809	395.5	513.6	21.881	6.55	13.52	1107.
38.	.01635	.5228	.6304	418.8	541.4	22.634	6.58	14.30	1066.
40.	.01703	.4611	.5797	443.0	570.8	23.387	6.60	15.06	1026.
42.	.01781	.4081	.5300	468.1	601.7	24.139	6.61	15.78	987.
44.	.01868	.3647	.4824	493.7	633.9	24.888	6.62	16.42	951.
46.	.01966	.3296	.4379	519.4	666.8	25.620	6.67	17.02	917.
48.	.02074	.3027	.3971	545.8	701.3	26.354	6.71	17.46	888.
50.	.02191	.2838	.3603	572.2	736.5	27.072	6.73	17.71	864.
55.	.02519	.2612	.2856	636.4	825.4	28.767	6.77	17.67	826.
60.	.02877	.2641	.2319	696.4	912.1	30.278	6.74	16.85	812.
65.	.03241	.2798	.1938	750.9	993.9	31.586	6.72	15.89	813.
70.	.03602	.3009	.1664	801.1	1071.3	32.734	6.73	15.09	821.
75.	.03958	.3248	.1460	848.3	1145.1	33.753	6.76	14.47	834.
80.	.04306	.3501	.1302	893.3	1216.2	34.671	6.82	14.01	848.
90.	.04983	.4017	.1076	979.4	1353.1	36.285	7.00	13.43	878.
100.	.05637	.4534	.0920	1063.0	1485.8	37.682	7.23	13.16	909.
110.	.06274	.5041	.0806	1148.0	1618.5	38.946	7.57	13.14	936.
120.	.06889	.5525	.0716	1232.4	1749.1	40.083	7.84	13.13	962.
140.	.08097	.6481	.0589	1405.1	2012.4	42.112	8.36	13.28	1015.
160.	.09278	.7407	.0503	1584.4	2280.2	43.899	8.81	13.52	1066.
180.	.10440	.8310	.0440	1769.9	2552.9	45.504	9.18	13.76	1116.
200.	.11589	.9198	.0392	1960.9	2830.0	46.965	9.48	13.96	1164.
220.	.12728	1.0074	.0353	2156.4	3111.0	48.303	9.72	14.13	1210.
240.	.13860	1.0940	.0322	2355.5	3395.0	49.539	9.91	14.27	1255.
260.	.14987	1.1800	.0295	2557.3	3681.3	50.686	10.05	14.37	1299.
280.	.16109	1.2654	.0273	2761.2	3969.4	51.753	10.16	14.44	1341.
300.	.17237	1.3524	.0254	2967.8	4260.5	52.755	10.23	14.49	1384.
350.	.20020	1.5628	.0217	3485.2	4986.7	54.994	10.34	14.55	1483.
400.	.22792	1.7719	.0189	4005.0	5714.4	56.938	10.38	14.56	1577.
450.	.25558	1.9801	.0168	4525.8	6442.6	58.653	10.39	14.56	1666.
500.	.28320	2.1878	.0151	5046.7	7170.7	60.186	10.41	14.56	1750.
550.	.31079	2.3951	.0137	5567.8	7898.7	61.575	10.42	14.57	1830.
600.	.33835	2.6021	.0125	6089.7	8627.4	62.839	10.43	14.58	1907.
650.	.36591	2.8090	.0116	6612.3	9356.6	64.003	10.45	14.59	1980.
700.	.39345	3.0157	.0107	7136.2	10087.1	65.093	10.49	14.62	2051.
750.	.42098	3.2223	.0100	7662.1	10819.4	66.105	10.53	14.66	2118.
800.	.44851	3.4289	.0094	8189.9	11553.7	67.053	10.57	14.71	2184.
850.	.47603	3.6354	.0088	8720.4	12290.7	67.946	10.63	14.76	2247.
900.	.50354	3.8418	.0083	9254.0	13030.6	68.791	10.70	14.83	2307.
950.	.53106	4.0482	.0079	9791.0	13773.9	69.593	10.78	14.91	2366.
1000.	.55857	4.2546	.0075	10331.7	14521.0	70.359	10.86	14.99	2423.
1100.	.61359	4.6673	.0068	11427.5	16029.4	71.786	11.04	15.17	2532.
1200.	.66860	5.0799	.0063	12542.7	17557.2	73.107	11.24	15.37	2635.
1300.	.72360	5.4924	.0058	13678.5	19105.5	74.346	11.45	15.58	2736.
1400.	.77860	5.9050	.0054	14835.8	20675.3	75.517	11.68	15.80	2827.
1500.	.83360	6.3175	.0050	16014.8	22266.8	76.629	11.90	16.03	2917.
1600.	.88860	6.7299	.0047	17214.6	23879.1	77.662	12.12	16.25	3003.
1700.	.94361	7.1424	.0044	18436.3	25513.4	78.648	12.34	16.46	3087.
1800.	.99861	7.5549	.0042	19680.3	27169.9	79.594	12.55	16.68	3168.
2000.	1.10869	8.3798	.0037	22238.0	30553.1	81.387	13.02	17.15	3323.
2200.	1.21897	9.2046	.0034	24895.0	34037.3	83.039	13.61	17.77	3466.
2400.	1.32979	10.0295	.0031	27694.7	37668.1	84.613	14.44	18.65	3599.
2600.	1.44176	10.8544	.0029	30706.1	41519.3	86.154	15.66	19.99	3721.
2800.	1.55591	11.6792	.0027	34034.0	45703.3	87.708	17.45	21.98	3834.
3000.	1.67378	12.5040	.0025	37819.0	50372.4	89.327	19.97	24.83	3941.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

7.50 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 16.111	80.8068	845.2	.25046	130.4681	.00771	99.00	301.68	.00068	1.26496	1.9861
17.	80.2397	862.8	.23940	125.5719	.00786	104.16	272.27	.00069	1.26295	1.7728
18.	79.5974	864.0	.23445	119.4158	.00830	108.80	245.65	.00069	1.26068	1.6189
19.	78.9247	866.1	.22964	113.7857	.00870	112.10	223.70	.00068	1.25830	1.5038
20.	78.2256	865.9	.22503	108.0897	.00911	115.22	205.38	.00067	1.25583	1.4063
22.	76.7506	865.4	.21622	97.6872	.00988	121.42	176.65	.00067	1.25064	1.2445
24.	75.1870	859.1	.20811	87.5452	.01072	125.04	155.27	.00065	1.24515	1.1436
26.	73.5243	846.1	.20050	77.5035	.01169	126.69	138.64	.00063	1.23933	1.0821
28.	71.7513	832.1	.19299	68.3162	.01271	126.84	125.23	.00060	1.23314	1.0441
30.	69.8724	813.7	.18569	59.5581	.01387	125.90	114.11	.00057	1.22661	1.0228
32.	67.8743	793.1	.17827	51.4795	.01515	123.21	104.63	.00054	1.21968	1.0202
34.	65.7579	771.4	.17090	44.2139	.01653	120.04	96.38	.00052	1.21238	1.0239
36.	63.5235	748.7	.16362	37.7079	.01806	116.54	89.11	.00049	1.20470	1.0336
38.	61.1683	725.6	.15650	31.9773	.01971	112.79	82.60	.00046	1.19663	1.0476
40.	58.7037	703.1	.14966	27.0684	.02142	108.89	76.76	.00044	1.18824	1.0614
42.	56.1449	682.2	.14284	22.9137	.02313	104.92	71.52	.00043	1.17956	1.0756
44.	53.5192	664.6	.13609	19.5199	.02471	101.02	66.86	.00041	1.17070	1.0870
46.	50.8635	651.5	.12904	16.7631	.02612	97.79	62.76	.00041	1.16178	1.0923
48.	48.2196	641.8	.12280	14.5944	.02721	94.72	59.21	.00040	1.15295	1.0916
50.	45.6339	636.8	.11726	12.9517	.02782	91.86	56.19	.00041	1.14436	1.0837
55.	39.6919	641.5	.10630	10.3687	.02754	85.94	50.75	.00044	1.12479	1.0435
60.	34.7645	667.3	.09892	9.1818	.02526	81.93	47.68	.00050	1.10873	.9807
65.	30.8574	707.8	.09342	8.6347	.02245	79.98	46.14	.00059	1.09611	.9166
70.	27.7609	757.4	.08908	8.3534	.01992	79.02	45.52	.00068	1.08618	.8692
75.	25.2673	813.4	.08544	8.2067	.01779	78.00	45.45	.00077	1.07823	.8430
80.	23.2233	874.3	.08225	8.1303	.01602	78.30	45.73	.00087	1.07175	.8180
90.	20.0686	1006.7	.07661	8.0614	.01334	82.12	46.97	.00110	1.06179	.7684
100.	17.7404	1150.4	.07177	8.0440	.01144	86.08	48.74	.00133	1.05449	.7450
110.	15.9399	1310.9	.06677	8.0348	.01003	90.10	49.87	.00155	1.04886	.7276
120.	14.5160	1470.1	.06294	8.0200	.00893	94.76	51.79	.00179	1.04443	.7176
140.	12.3498	1803.3	.05709	8.0044	.00736	105.01	56.03	.00231	1.03771	.7085
160.	10.7784	2144.2	.05302	7.9832	.00631	116.05	60.47	.00287	1.03286	.7046
180.	9.5788	2487.7	.05005	7.9601	.00553	127.34	64.93	.00348	1.02916	.7015
200.	8.6291	2829.5	.04786	7.9369	.00493	138.52	69.35	.00414	1.02624	.6990
220.	7.8567	3168.6	.04621	7.9145	.00446	149.40	73.70	.00484	1.02387	.6972
240.	7.2149	3502.2	.04497	7.8934	.00407	159.91	77.96	.00559	1.02191	.6956
260.	6.6725	3830.3	.04404	7.8737	.00375	170.01	82.15	.00638	1.02025	.6942
280.	6.2076	4152.5	.04333	7.8553	.00348	179.72	86.25	.00722	1.01883	.6931
300.	5.8015	4474.4	.04278	7.8457	.00324	189.07	90.28	.00810	1.01759	.6917
350.	4.9950	5243.4	.04194	7.8062	.00277	211.09	100.03	.01046	1.01513	.6893
400.	4.3874	5993.2	.04148	7.7739	.00243	231.60	109.38	.01305	1.01328	.6877
450.	3.9126	6732.1	.04121	7.7473	.00216	251.03	118.38	.01587	1.01184	.6866
500.	3.5311	7470.8	.04098	7.7252	.00195	269.70	127.08	.01888	1.01068	.6861
550.	3.2176	8207.6	.04080	7.7064	.00177	287.85	135.51	.02211	1.00973	.6857
600.	2.9555	8948.2	.04063	7.6905	.00163	305.64	143.70	.02554	1.00893	.6853
650.	2.7329	9692.7	.04045	7.6768	.00151	323.20	151.67	.02917	1.00826	.6849
700.	2.5416	10446.4	.04026	7.6648	.00140	340.62	159.46	.03299	1.00768	.6846
750.	2.3754	11208.8	.04004	7.6543	.00131	357.96	167.08	.03701	1.00718	.6842
800.	2.2296	11982.4	.03980	7.6451	.00123	375.29	174.54	.04120	1.00673	.6840
850.	2.1007	12769.1	.03953	7.6369	.00116	392.64	181.87	.04558	1.00634	.6838
900.	1.9859	13570.0	.03924	7.6295	.00109	410.04	189.06	.05012	1.00600	.6838
950.	1.8830	14386.2	.03892	7.6229	.00104	427.52	196.13	.05483	1.00568	.6838
1000.	1.7903	15218.2	.03858	7.6169	.00099	445.08	203.09	.05971	1.00540	.6840
1100.	1.6298	16919.0	.03790	7.6065	.00090	475.56	216.72	.06925	1.00492	.6913
1200.	1.4957	18678.6	.03718	7.5978	.00082	511.01	229.98	.08004	1.00451	.6916
1300.	1.3820	20496.2	.03645	7.5904	.00076	546.89	242.93	.09144	1.00417	.6921
1400.	1.2843	22368.9	.03573	7.5840	.00071	583.18	255.59	.10345	1.00387	.6925
1500.	1.1996	24292.8	.03502	7.5785	.00066	619.83	267.98	.11605	1.00362	.6930
1600.	1.1254	26247.9	.03437	7.5736	.00062	656.42	280.13	.12926	1.00339	.6933
1700.	1.0598	28245.2	.03374	7.5693	.00058	693.35	292.04	.14307	1.00320	.6934
1800.	1.0014	30289.8	.03314	7.5654	.00055	730.93	303.73	.15752	1.00302	.6932
2000.	.9020	34578.2	.03193	7.5583	.00050	810.60	326.49	.18860	1.00272	.6909
2200.	.8204	39357.4	.03053	7.5512	.00045	904.87	344.90	.22349	1.00247	.6772
2400.	.7520	45019.9	.02878	7.5422	.00041	1029.10	366.28	.26413	1.00227	.6639
2600.	.6936	52174.8	.02655	7.5286	.00038	1206.28	387.28	.31321	1.00209	.6418
2800.	.6427	61608.2	.02388	7.5063	.00036	1465.86	408.08	.37351	1.00194	.6120
3000.	.5974	74211.9	.02096	7.4705	.00033	1841.20	428.95	.44676	1.00180	.5785

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

8.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 16.253	.01234	1.6420	1.010	223.3	322.0	14.257	4.99	6.53	1465.
17.	.01241	1.6009	.9901	227.7	327.0	14.557	5.13	6.73	1450.
18.	.01251	1.5400	.9949	233.8	333.9	14.953	5.30	7.11	1437.
19.	.01262	1.4780	.9947	240.3	341.2	15.347	5.46	7.48	1424.
20.	.01273	1.4176	.9904	247.1	348.9	15.740	5.59	7.83	1409.
22.	.01296	1.3074	.9726	261.5	365.2	16.519	5.82	8.49	1382.
24.	.01323	1.2048	.9469	277.0	382.8	17.286	6.00	9.12	1354.
26.	.01352	1.0957	.9153	293.6	401.7	18.039	6.14	9.78	1320.
28.	.01384	.9928	.8791	311.2	421.9	18.787	6.27	10.44	1286.
30.	.01420	.8935	.8385	329.9	443.5	19.531	6.37	11.13	1249.
32.	.01460	.7993	.7939	349.7	466.4	20.271	6.45	11.83	1210.
34.	.01504	.7134	.7465	370.4	490.7	21.009	6.51	12.52	1171.
36.	.01554	.6345	.6978	392.1	516.5	21.744	6.56	13.24	1131.
38.	.01611	.5644	.6489	414.8	543.7	22.479	6.60	13.95	1093.
40.	.01674	.5024	.5998	438.3	572.3	23.212	6.61	14.64	1055.
42.	.01745	.4474	.5516	462.6	602.2	23.943	6.62	15.31	1017.
44.	.01824	.4026	.5050	487.5	633.5	24.669	6.63	15.91	983.
46.	.01912	.3647	.4611	512.4	665.3	25.376	6.58	16.49	949.
48.	.02009	.3360	.4206	538.0	698.7	26.087	6.71	16.91	920.
50.	.02114	.3135	.3835	563.7	732.8	26.784	6.74	17.22	895.
55.	.02408	.2847	.3071	626.9	819.6	28.437	6.78	17.34	853.
60.	.02732	.2819	.2508	686.7	905.3	29.930	6.76	16.75	836.
65.	.03068	.2941	.2100	741.6	987.0	31.237	6.74	15.91	833.
70.	.03403	.3128	.1802	792.4	1064.6	32.388	6.74	15.16	839.
75.	.03734	.3348	.1580	840.1	1138.8	33.413	6.77	14.57	849.
80.	.04059	.3590	.1408	885.7	1210.4	34.337	6.83	14.11	861.
90.	.04694	.4096	.1160	972.7	1348.3	35.962	7.01	13.53	889.
100.	.05309	.4605	.0991	1057.1	1481.9	37.370	7.24	13.24	918.
110.	.05908	.5107	.0866	1142.7	1615.4	38.640	7.58	13.22	944.
120.	.06494	.5604	.0771	1227.8	1747.3	39.789	7.85	13.22	971.
140.	.07623	.6547	.0632	1401.3	2011.2	41.823	8.37	13.33	1021.
160.	.08733	.7475	.0539	1581.2	2279.8	43.615	8.82	13.56	1072.
180.	.09825	.8380	.0471	1767.1	2553.2	45.225	9.19	13.79	1121.
200.	.10904	.9270	.0419	1958.5	2830.8	46.688	9.49	13.99	1169.
220.	.11974	1.0148	.0377	2154.2	3112.2	48.028	9.73	14.15	1215.
240.	.13037	1.1016	.0343	2353.6	3396.5	49.266	9.91	14.28	1260.
260.	.14095	1.1877	.0315	2555.6	3683.2	50.413	10.05	14.38	1303.
280.	.15148	1.2733	.0292	2759.7	3971.6	51.482	10.16	14.45	1346.
300.	.16207	1.3605	.0271	2966.5	4263.0	52.485	10.24	14.50	1388.
350.	.18818	1.5711	.0231	3484.2	4989.6	54.725	10.34	14.55	1487.
400.	.21418	1.7803	.0202	4004.2	5717.7	56.670	10.38	14.57	1581.
450.	.24012	1.9885	.0179	4525.1	6446.1	58.385	10.39	14.56	1669.
500.	.26602	2.1963	.0161	5046.2	7174.3	59.919	10.41	14.56	1753.
550.	.29188	2.4036	.0146	5567.4	7902.4	61.308	10.42	14.57	1833.
600.	.31773	2.6107	.0134	6089.4	8631.2	62.573	10.43	14.58	1910.
650.	.34356	2.8175	.0123	6611.9	9360.5	63.737	10.46	14.60	1983.
700.	.36939	3.0243	.0114	7136.0	10091.1	64.826	10.49	14.62	2054.
750.	.39520	3.2309	.0107	7661.8	10823.4	65.838	10.53	14.66	2121.
800.	.42101	3.4375	.0100	8189.7	11557.7	66.786	10.57	14.71	2186.
850.	.44681	3.6440	.0094	8720.3	12294.8	67.679	10.63	14.76	2249.
900.	.47261	3.8504	.0089	9253.9	13034.7	68.524	10.70	14.83	2310.
950.	.49840	4.0568	.0084	9790.9	13778.1	69.327	10.78	14.91	2369.
1000.	.52419	4.2632	.0080	10331.6	14525.1	70.092	10.86	14.99	2426.
1100.	.57577	4.6758	.0073	11427.5	16033.6	71.519	11.04	15.17	2534.
1200.	.62735	5.0885	.0067	12542.6	17561.4	72.841	11.24	15.37	2637.
1300.	.67891	5.5010	.0062	13678.5	19109.8	74.080	11.45	15.58	2735.
1400.	.73048	5.9135	.0057	14835.7	20679.6	75.250	11.68	15.80	2829.
1500.	.78204	6.3260	.0053	16014.8	22271.1	76.362	11.90	16.03	2919.
1600.	.83361	6.7385	.0050	17214.6	23883.4	77.396	12.12	16.25	3005.
1700.	.88517	7.1510	.0047	18436.3	25517.7	78.382	12.34	16.46	3089.
1800.	.93674	7.5634	.0044	19680.1	27174.1	79.328	12.55	16.68	3170.
2000.	1.03993	8.3883	.0040	22237.3	30556.8	81.120	13.02	17.15	3325.
2200.	1.14331	9.2132	.0036	24892.8	34039.3	82.772	13.60	17.75	3468.
2400.	1.24718	10.0380	.0033	27688.4	37665.8	84.344	14.41	18.62	3601.
2600.	1.35210	10.8629	.0031	30690.9	41507.6	85.881	15.61	19.92	3723.
2800.	1.45899	11.6877	.0029	34001.4	45673.4	87.429	17.35	21.86	3837.
3000.	1.56927	12.5126	.0027	37756.2	50310.4	89.037	19.79	24.63	3944.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

8.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 16.253	81.0262	860.5	.24956	133.0474	.00759	100.47	304.73	.00068	1.26573	1.9807
17.	80.5578	876.8	.23972	128.9649	.00768	104.78	279.55	.00070	1.26407	1.7960
18.	79.9223	879.9	.23480	123.0814	.00808	109.51	251.89	.00069	1.26183	1.6360
19.	79.2669	880.9	.23004	117.1587	.00849	112.90	229.28	.00069	1.25951	1.5189
20.	78.5812	880.8	.22547	111.3942	.00889	116.11	210.37	.00068	1.25709	1.4188
22.	77.1386	880.4	.21681	100.8483	.00964	122.49	180.78	.00067	1.25201	1.2531
24.	75.6049	877.4	.20886	91.0901	.01040	126.25	158.77	.00066	1.24662	1.1470
26.	73.9871	865.9	.20134	81.0675	.01129	128.07	141.79	.00064	1.24095	1.0823
28.	72.2675	852.4	.19397	71.7474	.01225	128.38	128.13	.00061	1.23494	1.0424
30.	70.4457	835.3	.18684	62.9424	.01332	127.60	116.83	.00059	1.22860	1.0188
32.	68.5164	815.8	.17960	54.7641	.01450	125.05	107.23	.00056	1.22191	1.0141
34.	66.4798	795.6	.17242	47.4290	.01574	122.04	98.93	.00053	1.21487	1.0150
36.	64.3373	774.3	.16529	40.8199	.01709	118.71	91.62	.00050	1.20749	1.0215
38.	62.0887	753.4	.15844	35.0456	.01852	115.12	85.10	.00048	1.19978	1.0312
40.	59.7429	732.4	.15188	30.0121	.01999	111.40	79.26	.00046	1.19177	1.0414
42.	57.3140	712.0	.14537	25.6429	.02151	107.60	74.03	.00044	1.18352	1.0536
44.	54.8247	695.3	.13886	22.0737	.02288	103.85	69.35	.00043	1.17510	1.0623
46.	52.3052	682.0	.13194	19.0754	.02418	100.46	65.22	.00042	1.16662	1.0703
48.	49.7865	672.5	.12581	16.7280	.02514	97.47	61.61	.00042	1.15818	1.0688
50.	47.3102	666.0	.12027	14.8314	.02586	94.68	58.51	.00042	1.14993	1.0643
55.	41.5265	667.7	.10909	11.8232	.02597	88.73	52.76	.00044	1.13081	1.0310
60.	36.5979	689.2	.10140	10.3163	.02431	84.55	49.34	.00050	1.11469	.9776
65.	32.5995	726.4	.09559	9.5875	.02190	82.35	47.52	.00057	1.10173	.9180
70.	29.3897	773.2	.09094	9.1934	.01960	81.14	46.69	.00066	1.09140	.8722
75.	26.7843	826.9	.08707	8.9679	.01762	79.91	46.48	.00074	1.08307	.8473
80.	24.6339	886.2	.08368	8.8430	.01592	80.02	46.64	.00083	1.07622	.8224
90.	21.3028	1017.1	.07774	8.7248	.01330	83.61	47.70	.00104	1.06568	.7718
100.	18.8344	1159.4	.07268	8.6726	.01142	87.39	49.33	.00126	1.05792	.7475
110.	16.9254	1319.3	.06753	8.6443	.01002	91.34	50.43	.00147	1.05194	.7298
120.	15.3987	1479.6	.06378	8.6301	.00893	95.82	52.24	.00169	1.04718	.7207
140.	13.1174	1812.0	.05754	8.5880	.00735	105.80	56.35	.00218	1.04009	.7098
160.	11.4504	2153.3	.05338	8.5589	.00630	116.65	60.71	.00271	1.03493	.7056
180.	10.1779	2497.3	.05035	8.5295	.00552	127.81	65.13	.00328	1.03101	.7025
200.	9.1706	2839.7	.04812	8.5012	.00492	138.90	69.51	.00390	1.02791	.6999
220.	8.3512	3179.3	.04643	8.4745	.00445	149.71	73.83	.00456	1.02539	.6979
240.	7.6703	3513.5	.04517	8.4496	.00407	160.17	78.08	.00526	1.02330	.6963
260.	7.0948	3842.0	.04422	8.4266	.00374	170.23	82.25	.00601	1.02154	.6949
280.	6.6015	4164.6	.04350	8.4053	.00347	179.91	86.34	.00679	1.02003	.6936
300.	6.1701	4481.4	.04293	8.3944	.00323	189.23	90.36	.00762	1.01872	.6922
350.	5.3141	5257.0	.04207	8.3490	.00277	211.21	100.09	.00983	1.01610	.6896
400.	4.6690	6007.2	.04159	8.3119	.00242	231.70	109.43	.01227	1.01414	.6879
450.	4.1646	6746.4	.04130	8.2815	.00216	251.11	118.42	.01491	1.01260	.6868
500.	3.7592	7485.3	.04106	8.2561	.00195	269.77	127.11	.01774	1.01137	.6863
550.	3.4260	8222.3	.04088	8.2348	.00177	287.90	135.54	.02077	1.01036	.6858
600.	3.1473	8963.0	.04070	8.2166	.00163	305.69	143.72	.02398	1.00951	.6854
650.	2.9107	9707.6	.04052	8.2009	.00150	323.24	151.70	.02739	1.00880	.6850
700.	2.7072	10461.5	.04031	8.1873	.00140	340.66	159.48	.03098	1.00818	.6846
750.	2.5304	11223.9	.04009	8.1754	.00131	358.00	167.10	.03474	1.00764	.6843
800.	2.3753	11997.6	.03985	8.1649	.00123	375.33	174.56	.03868	1.00717	.6840
850.	2.2381	12784.4	.03958	8.1555	.00115	392.67	181.88	.04278	1.00676	.6839
900.	2.1159	13585.4	.03928	8.1471	.00109	410.07	189.07	.04704	1.00639	.6838
950.	2.0064	14401.7	.03896	8.1396	.00104	427.54	196.14	.05146	1.00606	.6839
1000.	1.9077	15233.8	.03862	8.1328	.00098	445.10	203.11	.05603	1.00576	.6840
1100.	1.7368	16934.8	.03793	8.1210	.00090	475.56	216.73	.06498	1.00524	.6913
1200.	1.5940	18694.7	.03721	8.1111	.00082	511.01	229.99	.07510	1.00481	.6917
1300.	1.4729	20512.5	.03648	8.1027	.00076	546.89	242.94	.08579	1.00444	.6921
1400.	1.3690	22385.4	.03575	8.0954	.00071	583.18	255.60	.09705	1.00413	.6926
1500.	1.2787	24309.4	.03504	8.0891	.00066	619.82	267.99	.10888	1.00386	.6930
1600.	1.1996	26264.5	.03439	8.0836	.00062	656.41	280.14	.12126	1.00362	.6933
1700.	1.1297	28261.5	.03377	8.0787	.00058	693.31	292.05	.13421	1.00341	.6934
1800.	1.0675	30305.0	.03316	8.0742	.00055	730.84	303.74	.14775	1.00322	.6932
2000.	.9616	34587.0	.03196	8.0662	.00050	810.25	326.49	.17687	1.00290	.6911
2200.	.8747	39347.0	.03057	8.0583	.00045	903.77	344.90	.20952	1.00264	.6775
2400.	.8018	44964.2	.02885	8.0486	.00041	1026.25	366.28	.24746	1.00242	.6646
2600.	.7396	52028.1	.02666	8.0341	.00038	1199.99	387.27	.29316	1.00223	.6430
2800.	.6854	61300.6	.02403	8.0108	.00036	1453.49	408.05	.34921	1.00207	.6137
3000.	.6372	73647.0	.02115	7.9735	.00033	1819.14	428.89	.41728	1.00192	.5807

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

8.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 16.393	.01231	1.6692	1.013	223.7	328.3	14.267	5.01	6.54	1476.
17.	.01237	1.6339	1.011	227.3	332.4	14.509	5.12	6.75	1467.
18.	.01246	1.5765	.9987	233.4	339.3	14.903	5.29	7.06	1450.
19.	.01256	1.5135	.9994	239.7	346.5	15.294	5.45	7.43	1436.
20.	.01267	1.4572	.9958	246.4	354.1	15.684	5.58	7.77	1424.
22.	.01290	1.3409	.9794	260.7	370.3	16.458	5.81	8.43	1395.
24.	.01316	1.2442	.9545	276.0	387.8	17.218	5.99	9.04	1369.
26.	.01343	1.1344	.9246	292.3	406.5	17.964	6.14	9.68	1337.
28.	.01374	1.0333	.8894	309.7	426.5	18.704	6.27	10.32	1304.
30.	.01409	.9353	.8502	328.1	447.8	19.439	6.37	10.97	1269.
32.	.01447	.8422	.8071	347.4	470.4	20.168	6.45	11.64	1232.
34.	.01489	.7561	.7612	367.8	494.3	20.894	6.52	12.30	1194.
36.	.01536	.6773	.7138	389.0	519.6	21.616	6.57	12.96	1156.
38.	.01589	.6056	.6662	411.1	546.2	22.335	6.61	13.64	1118.
40.	.01647	.5428	.6186	434.1	574.1	23.051	6.62	14.28	1082.
42.	.01713	.4862	.5717	457.7	603.3	23.763	6.63	14.91	1046.
44.	.01785	.4402	.5261	481.9	633.7	24.469	6.65	15.47	1012.
46.	.01865	.4012	.4829	506.1	664.6	25.157	6.69	15.99	979.
48.	.01953	.3691	.4426	531.1	697.1	25.847	6.72	16.44	950.
50.	.02048	.3449	.4055	556.2	730.3	26.525	6.75	16.75	925.
55.	.02314	.3092	.3277	618.3	815.0	28.139	6.79	17.02	880.
60.	.02610	.3010	.2692	677.7	899.5	29.612	6.77	16.61	859.
65.	.02919	.3091	.2260	732.8	980.9	30.913	6.75	15.91	853.
70.	.03230	.3258	.1941	784.0	1058.6	32.066	6.76	15.20	856.
75.	.03540	.3463	.1700	832.3	1133.1	33.095	6.79	14.63	864.
80.	.03845	.3688	.1514	878.3	1205.1	34.024	6.84	14.19	875.
90.	.04442	.4179	.1246	966.2	1343.8	35.660	7.02	13.61	900.
100.	.05022	.4679	.1062	1051.4	1478.3	37.076	7.25	13.32	928.
110.	.05587	.5180	.0927	1137.5	1612.5	38.353	7.59	13.29	952.
120.	.06140	.5675	.0824	1223.1	1745.1	39.507	7.86	13.28	979.
140.	.07206	.6615	.0674	1397.6	2010.2	41.551	8.38	13.37	1027.
160.	.08253	.7544	.0575	1578.0	2279.6	43.348	8.82	13.59	1078.
180.	.09283	.8452	.0502	1764.4	2553.5	44.961	9.20	13.81	1127.
200.	.10301	.9343	.0446	1956.1	2831.7	46.427	9.49	14.01	1174.
220.	.11309	1.0222	.0402	2152.1	3113.4	47.770	9.73	14.17	1220.
240.	.12311	1.1092	.0366	2351.7	3398.1	49.009	9.92	14.30	1265.
260.	.13308	1.1955	.0336	2553.9	3685.1	50.157	10.06	14.40	1308.
280.	.14300	1.2811	.0310	2758.2	3973.7	51.227	10.16	14.47	1350.
300.	.15299	1.3687	.0288	2965.2	4265.6	52.231	10.24	14.51	1392.
350.	.17757	1.5794	.0246	3483.2	4992.5	54.473	10.34	14.56	1491.
400.	.20205	1.7887	.0214	4003.4	5720.9	56.418	10.38	14.57	1584.
450.	.22647	1.9970	.0190	4524.5	6449.5	58.134	10.39	14.57	1673.
500.	.25085	2.2048	.0171	5045.6	7177.9	59.668	10.41	14.57	1757.
550.	.27520	2.4121	.0155	5567.0	7906.2	61.057	10.42	14.57	1837.
600.	.29953	2.6192	.0142	6089.0	8635.0	62.322	10.44	14.58	1913.
650.	.32385	2.8261	.0131	6611.7	9364.4	63.486	10.46	14.60	1986.
700.	.34815	3.0329	.0122	7135.7	10095.0	64.576	10.49	14.62	2056.
750.	.37245	3.2395	.0113	7661.6	10827.5	65.588	10.53	14.66	2124.
800.	.39674	3.4461	.0106	8189.5	11561.8	66.536	10.58	14.71	2189.
850.	.42103	3.6525	.0100	8720.1	12298.9	67.429	10.63	14.76	2252.
900.	.44531	3.8590	.0094	9253.7	13038.9	68.274	10.70	14.83	2313.
950.	.46959	4.0654	.0090	9790.7	13782.2	69.077	10.78	14.91	2371.
1000.	.49386	4.2718	.0085	10331.5	14529.3	69.842	10.86	14.99	2428.
1100.	.54241	4.6844	.0077	11427.4	16037.9	71.269	11.04	15.17	2537.
1200.	.59095	5.0970	.0071	12542.6	17565.7	72.591	11.24	15.37	2640.
1300.	.63948	5.5096	.0065	13678.5	19114.1	73.830	11.45	15.58	2737.
1400.	.68802	5.9221	.0061	14835.7	20683.9	75.000	11.68	15.80	2831.
1500.	.73655	6.3346	.0057	16014.8	22275.4	76.112	11.90	16.03	2921.
1600.	.78508	6.7471	.0053	17214.6	23887.7	77.146	12.12	16.25	3007.
1700.	.83361	7.1595	.0050	18436.3	25521.9	78.132	12.34	16.46	3091.
1800.	.88214	7.5720	.0047	19680.0	27178.3	79.078	12.55	16.68	3172.
2000.	.97926	8.3969	.0042	22236.8	30560.5	80.870	13.01	17.15	3326.
2200.	1.07656	9.2217	.0039	24890.8	34041.6	82.521	13.59	17.74	3470.
2400.	1.17429	10.0466	.0035	27682.6	37664.1	84.091	14.38	18.59	3603.
2600.	1.27299	10.8714	.0033	30677.0	41497.4	85.625	15.55	19.56	3726.
2800.	1.37349	11.6962	.0030	33971.8	45646.5	87.166	17.25	21.75	3839.
3000.	1.47708	12.5211	.0028	37699.1	50254.3	88.764	19.62	24.44	3947.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

8.50 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 16.393	81.2423	875.6	.24870	135.6095	.00747	101.90	307.78	.00069	1.26650	1.9761
17.	80.8703	881.6	.24423	132.1374	.00765	105.39	287.00	.00070	1.26518	1.8379
18.	80.2449	894.4	.23517	126.5040	.00789	110.21	258.32	.00070	1.26297	1.6550
19.	79.6007	895.3	.23045	120.4719	.00830	113.70	234.94	.00069	1.26069	1.5346
20.	78.9312	897.3	.22592	115.0148	.00866	117.00	215.46	.00069	1.25832	1.4307
22.	77.5153	894.8	.21739	103.9436	.00942	123.54	184.95	.00068	1.25333	1.2623
24.	76.0156	895.4	.20947	94.5794	.01009	127.46	162.34	.00067	1.24806	1.1510
26.	74.4371	884.1	.20215	84.4415	.01095	129.43	144.95	.00065	1.24252	1.0841
28.	72.7598	872.5	.19487	75.1825	.01183	129.87	130.99	.00062	1.23666	1.0411
30.	70.9918	857.1	.18788	66.4015	.01280	129.23	119.51	.00060	1.23050	1.0149
32.	69.1248	839.4	.18083	58.2147	.01386	126.82	109.79	.00057	1.22401	1.0075
34.	67.1598	820.3	.17382	50.7768	.01499	123.95	101.41	.00054	1.21721	1.0061
36.	65.0992	800.6	.16687	44.0922	.01619	120.77	94.06	.00052	1.21011	1.0095
38.	62.9442	780.3	.16018	38.1217	.01748	117.34	87.52	.00049	1.20271	1.0171
40.	60.7011	760.4	.15389	32.9474	.01878	113.76	81.67	.00047	1.19504	1.0250
42.	58.3846	740.6	.14762	28.3870	.02014	110.11	76.43	.00046	1.18715	1.0353
44.	56.0125	724.7	.14133	24.6546	.02134	106.49	71.74	.00044	1.17911	1.0419
46.	53.6100	712.5	.13457	21.5090	.02245	102.99	67.58	.00043	1.17100	1.0495
48.	51.2062	702.0	.12853	18.9005	.02342	100.07	63.92	.00043	1.16293	1.0501
50.	48.8290	695.6	.12303	16.8418	.02408	97.32	60.74	.00043	1.15499	1.0454
55.	43.2115	693.9	.11171	13.3614	.02453	91.39	54.73	.00045	1.13635	1.0192
60.	38.3166	711.7	.10376	11.5348	.02334	87.07	51.00	.00049	1.12029	.9730
65.	34.2607	745.3	.09768	10.5900	.02134	84.67	48.90	.00056	1.10710	.9187
70.	30.9579	790.1	.09278	10.0875	.01924	83.24	47.87	.00064	1.09644	.8742
75.	28.2510	841.9	.08866	9.7825	.01738	81.80	47.50	.00071	1.08775	.8495
80.	26.0082	899.2	.08508	9.5917	.01579	81.74	47.55	.00080	1.08059	.8257
90.	22.5111	1028.0	.07886	9.4076	.01324	85.09	48.44	.00100	1.06950	.7749
100.	19.9114	1169.0	.07359	9.3175	.01139	88.69	49.93	.00120	1.06130	.7499
110.	17.8975	1328.6	.06828	9.2711	.01000	92.60	51.00	.00140	1.05498	.7318
120.	16.2857	1488.6	.06441	9.2424	.00892	96.90	52.70	.00161	1.04994	.7222
140.	13.8772	1820.9	.05798	9.1792	.00734	106.61	56.68	.00207	1.04245	.7110
160.	12.1163	2162.7	.05374	9.1408	.00629	117.27	60.97	.00256	1.03699	.7067
180.	10.7720	2507.1	.05064	9.1044	.00551	128.30	65.33	.00310	1.03284	.7034
200.	9.7079	2850.0	.04837	9.0703	.00492	139.29	69.67	.00369	1.02956	.7007
220.	8.8421	3190.2	.04665	9.0388	.00444	150.03	73.97	.00431	1.02690	.6987
240.	8.1226	3524.8	.04537	9.0098	.00406	160.43	78.20	.00497	1.02469	.6970
260.	7.5144	3853.8	.04440	8.9832	.00374	170.45	82.35	.00567	1.02283	.6955
280.	6.9930	4176.8	.04366	8.9587	.00346	180.10	86.43	.00641	1.02123	.6942
300.	6.5365	4500.6	.04308	8.9465	.00322	189.40	90.44	.00719	1.01983	.6927
350.	5.6315	5270.8	.04219	8.8946	.00276	211.34	100.16	.00928	1.01707	.6900
400.	4.9492	6021.3	.04169	8.8524	.00242	231.79	109.48	.01157	1.01499	.6882
450.	4.4155	6760.8	.04139	8.8179	.00215	251.19	118.47	.01406	1.01337	.6870
500.	3.9864	7499.8	.04115	8.7891	.00194	269.83	127.15	.01673	1.01206	.6864
550.	3.6337	8237.0	.04095	8.7649	.00177	287.96	135.57	.01958	1.01099	.6859
600.	3.3385	8977.8	.04076	8.7444	.00162	305.74	143.75	.02261	1.01010	.6855
650.	3.0879	9722.5	.04058	8.7266	.00150	323.29	151.72	.02582	1.00933	.6850
700.	2.8723	10476.5	.04037	8.7113	.00140	340.70	159.51	.02920	1.00868	.6847
750.	2.6849	11239.0	.04015	8.6978	.00130	358.04	167.12	.03274	1.00811	.6844
800.	2.5205	12012.8	.03990	8.6859	.00122	375.36	174.58	.03645	1.00761	.6841
850.	2.3751	12799.7	.03962	8.6753	.00115	392.70	181.90	.04031	1.00717	.6839
900.	2.2456	13600.8	.03932	8.6659	.00109	410.10	189.09	.04433	1.00678	.6838
950.	2.1295	14417.2	.03900	8.6574	.00103	427.57	196.16	.04849	1.00643	.6839
1000.	2.0249	15249.4	.03866	8.6497	.00098	445.13	203.12	.05279	1.00611	.6841
1100.	1.8436	16950.6	.03796	8.6363	.00089	475.56	216.74	.06121	1.00557	.6914
1200.	1.6922	18710.7	.03724	8.6252	.00082	511.01	230.00	.07074	1.00511	.6917
1300.	1.5638	20528.7	.03651	8.6157	.00076	546.89	242.95	.08081	1.00472	.6921
1400.	1.4535	22401.9	.03578	8.6075	.00071	583.18	255.61	.09141	1.00439	.6926
1500.	1.3577	24326.1	.03507	8.6004	.00066	619.82	268.00	.10254	1.00410	.6930
1600.	1.2738	26281.2	.03441	8.5941	.00062	656.39	280.14	.11420	1.00384	.6933
1700.	1.1996	28277.8	.03379	8.5886	.00058	693.28	292.06	.12639	1.00362	.6935
1800.	1.1336	30320.4	.03318	8.5836	.00055	730.76	303.75	.13914	1.00342	.6933
2000.	1.0212	34596.5	.03198	8.5747	.00050	809.93	326.50	.16653	1.00308	.6912
2200.	.9289	39339.1	.03061	8.5660	.00045	902.77	344.90	.19720	1.00280	.6778
2400.	.8516	44915.1	.02891	8.5554	.00041	1023.67	366.27	.23277	1.00257	.6652
2600.	.7856	51896.2	.02676	8.5401	.00038	1194.26	387.26	.27552	1.00237	.6441
2800.	.7281	61022.2	.02417	8.5157	.00036	1442.22	408.03	.32785	1.00220	.6154
3000.	.6770	73134.4	.02133	8.4769	.00033	1799.05	428.84	.39139	1.00204	.5826

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

9.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 16.532	.01228	1.6961	1.017	224.2	334.7	14.277	5.04	6.55	1486.
17.	.01232	1.6692	1.016	226.9	337.8	14.462	5.12	6.71	1480.
18.	.01241	1.6121	1.002	232.9	344.6	14.854	5.28	7.01	1463.
19.	.01251	1.5533	1.004	239.2	351.8	15.243	5.44	7.37	1451.
20.	.01262	1.4930	1.001	245.8	359.4	15.630	5.58	7.71	1437.
22.	.01284	1.3811	.9860	259.9	375.4	16.398	5.81	8.36	1410.
24.	.01309	1.2824	.9620	275.0	392.8	17.152	5.99	8.96	1385.
26.	.01336	1.1751	.9332	291.1	411.3	17.893	6.14	9.58	1354.
28.	.01365	1.0720	.8993	308.2	431.1	18.624	6.27	10.21	1321.
30.	.01398	.9744	.8614	326.3	452.2	19.351	6.38	10.84	1287.
32.	.01435	.8838	.8197	345.3	474.5	20.071	6.46	11.47	1252.
34.	.01475	.7976	.7752	365.3	498.0	20.785	6.53	12.10	1216.
36.	.01519	.7185	.7291	386.1	522.9	21.495	6.58	12.73	1179.
38.	.01569	.6459	.6826	407.8	549.0	22.200	6.62	13.36	1142.
40.	.01624	.5822	.6363	430.2	576.3	22.902	6.63	13.97	1107.
42.	.01684	.5245	.5904	453.3	604.9	23.597	6.65	14.56	1072.
44.	.01751	.4773	.5459	476.9	634.5	24.287	6.66	15.08	1040.
46.	.01825	.4369	.5033	500.4	664.6	24.956	6.71	15.59	1008.
48.	.01905	.4034	.4633	524.8	696.3	25.629	6.74	16.00	979.
50.	.01991	.3760	.4263	549.4	728.6	26.289	6.76	16.35	953.
55.	.02234	.3353	.3476	610.4	811.4	27.868	6.80	16.69	907.
60.	.02505	.3212	.2873	669.3	894.8	29.319	6.79	16.46	883.
65.	.02791	.3258	.2419	724.5	975.7	30.613	6.77	15.86	874.
70.	.03081	.3399	.2079	776.1	1053.4	31.766	6.77	15.22	874.
75.	.03370	.3585	.1821	824.7	1128.1	32.797	6.80	14.68	880.
80.	.03657	.3799	.1621	871.2	1200.4	33.730	6.85	14.25	889.
90.	.04220	.4268	.1332	959.9	1339.8	35.374	7.03	13.69	912.
100.	.04769	.4760	.1133	1045.8	1474.9	36.797	7.25	13.39	937.
110.	.05303	.5257	.0989	1132.5	1609.8	38.081	7.60	13.35	961.
120.	.05827	.5749	.0878	1218.5	1743.0	39.241	7.87	13.34	987.
140.	.06836	.6684	.0729	1394.0	2009.2	41.293	8.39	13.46	1036.
160.	.07827	.7615	.0610	1574.9	2279.4	43.096	8.83	13.63	1084.
180.	.08802	.8524	.0533	1761.7	2553.9	44.713	9.20	13.84	1132.
200.	.09765	.9417	.0473	1953.7	2832.6	46.181	9.50	14.03	1179.
220.	.10719	1.0298	.0426	2150.1	3114.8	47.525	9.74	14.19	1225.
240.	.11666	1.1169	.0388	2349.8	3399.8	48.766	9.92	14.32	1269.
260.	.12608	1.2033	.0356	2552.3	3687.0	49.916	10.06	14.41	1313.
280.	.13546	1.2890	.0329	2756.7	3975.9	50.986	10.17	14.48	1355.
300.	.14491	1.3769	.0306	2963.9	4268.1	51.991	10.24	14.52	1397.
350.	.16814	1.5878	.0260	3482.2	4995.5	54.234	10.34	14.57	1495.
400.	.19128	1.7971	.0227	4002.7	5724.1	56.180	10.38	14.58	1588.
450.	.21435	2.0055	.0201	4523.9	6453.0	57.897	10.40	14.57	1676.
500.	.23737	2.2133	.0181	5045.1	7181.5	59.431	10.41	14.57	1760.
550.	.26038	2.4207	.0164	5566.5	7909.9	60.820	10.42	14.57	1840.
600.	.28336	2.6278	.0150	6088.7	8638.9	62.086	10.44	14.58	1916.
650.	.30632	2.8347	.0139	6611.4	9368.3	63.250	10.46	14.60	1989.
700.	.32928	3.0414	.0129	7135.5	10099.0	64.340	10.49	14.63	2059.
750.	.35223	3.2481	.0120	7661.4	10831.5	65.352	10.53	14.66	2127.
800.	.37517	3.4546	.0113	8189.3	11565.9	66.300	10.58	14.71	2192.
850.	.39811	3.6611	.0106	8720.0	12303.0	67.193	10.63	14.77	2255.
900.	.42104	3.8676	.0100	9253.6	13043.0	68.038	10.70	14.83	2315.
950.	.44397	4.0740	.0095	9790.6	13786.4	68.841	10.78	14.91	2374.
1000.	.46690	4.2803	.0090	10331.4	14533.5	69.606	10.86	14.99	2430.
1100.	.51275	4.6930	.0082	11427.3	16042.1	71.033	11.04	15.17	2539.
1200.	.55859	5.1056	.0075	12542.6	17569.9	72.355	11.24	15.37	2642.
1300.	.60443	5.5181	.0069	13678.4	19118.3	73.594	11.45	15.58	2740.
1400.	.65027	5.9306	.0064	14835.7	20688.2	74.764	11.68	15.80	2833.
1500.	.69610	6.3431	.0060	16014.8	22279.7	75.876	11.90	16.03	2923.
1600.	.74194	6.7556	.0056	17214.6	23892.0	76.910	12.12	16.25	3009.
1700.	.78777	7.1681	.0053	18436.2	25526.2	77.896	12.34	16.46	3093.
1800.	.83361	7.5805	.0050	19679.9	27182.5	78.842	12.55	16.68	3174.
2000.	.92534	8.4054	.0045	22236.3	30564.3	80.634	13.01	17.14	3328.
2200.	1.01722	9.2302	.0041	24889.0	34044.0	82.284	13.58	17.73	3472.
2400.	1.10951	10.0551	.0037	27677.4	37663.0	83.853	14.36	18.57	3605.
2600.	1.20268	10.8799	.0035	30664.3	41488.4	85.383	15.50	19.81	3728.
2800.	1.29751	11.7047	.0032	33944.7	45622.3	86.919	17.16	21.65	3842.
3000.	1.39517	12.5295	.0030	37646.8	50203.3	88.508	19.47	24.27	3950.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

9.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 16.532	81.4554	890.6	.24789	138.1552	.00736	103.31	310.83	.00070	1.26725	1.9721
17.	81.1730	895.3	.24453	135.4970	.00750	105.98	294.51	.00070	1.26625	1.8650
18.	80.5602	908.4	.23555	129.8708	.00772	110.91	264.86	.00071	1.26408	1.6746
19.	79.9262	911.5	.23085	124.1492	.00809	114.47	240.66	.00070	1.26184	1.5494
20.	79.2690	912.1	.22638	118.3460	.00846	117.86	220.56	.00069	1.25952	1.4437
22.	77.8849	912.3	.21792	107.5642	.00917	124.57	189.18	.00069	1.25463	1.2699
24.	76.4138	912.7	.21005	97.9929	.00982	128.64	165.92	.00068	1.24946	1.1556
26.	74.8671	903.3	.20287	87.9744	.01061	130.73	148.08	.00066	1.24403	1.0853
28.	73.2363	891.6	.19571	78.5108	.01145	131.32	133.86	.00063	1.23832	1.0410
30.	71.5159	877.3	.18886	69.6865	.01236	130.82	122.17	.00061	1.23232	1.0128
32.	69.7035	862.0	.18197	61.6012	.01331	128.53	112.31	.00058	1.22602	1.0023
34.	67.8035	844.1	.17512	54.0768	.01433	125.79	103.84	.00055	1.21944	.9990
36.	65.8160	825.6	.16834	47.2894	.01542	122.74	96.44	.00053	1.21258	1.0001
38.	63.7448	806.2	.16178	41.1748	.01658	119.45	89.88	.00050	1.20545	1.0056
40.	61.5924	787.1	.15571	35.8566	.01775	116.01	84.01	.00049	1.19808	1.0115
42.	59.3733	768.2	.14963	31.1432	.01896	112.48	78.75	.00047	1.19051	1.0196
44.	57.1032	753.1	.14356	27.2551	.02003	108.98	74.04	.00046	1.18280	1.0248
46.	54.8048	741.4	.13695	23.9435	.02102	105.58	69.85	.00044	1.17503	1.0311
48.	52.5005	731.5	.13100	21.1785	.02188	102.50	66.14	.00044	1.16727	1.0326
50.	50.2172	724.0	.12556	18.8815	.02258	99.82	62.90	.00044	1.15962	1.0301
55.	44.7640	720.7	.11418	15.0090	.02316	93.91	56.65	.00045	1.14148	1.0069
60.	39.9253	734.6	.10603	12.8224	.02240	89.51	52.65	.00049	1.12555	.9681
65.	35.8352	765.5	.09972	11.6755	.02072	86.93	50.28	.00055	1.11221	.9175
70.	32.4579	807.8	.09457	11.0340	.01884	85.29	49.04	.00062	1.10127	.8751
75.	29.6713	857.5	.09025	10.6364	.01712	83.69	48.52	.00069	1.09230	.8513
80.	27.3427	913.4	.08648	10.3866	.01560	83.45	48.46	.00077	1.08485	.8277
90.	23.6951	1039.4	.07998	10.1123	.01317	86.57	49.17	.00096	1.07324	.7776
100.	20.9705	1179.4	.07450	9.9825	.01135	90.00	50.54	.00115	1.06463	.7520
110.	18.8557	1338.4	.06903	9.9125	.00998	93.88	51.58	.00134	1.05798	.7335
120.	17.1614	1498.2	.06504	9.8667	.00890	97.99	53.18	.00154	1.05268	.7237
140.	14.6292	1828.3	.05865	9.7779	.00736	107.43	57.02	.00196	1.04478	.7144
160.	12.7759	2172.3	.05409	9.7290	.00627	117.90	61.23	.00244	1.03903	.7077
180.	11.3611	2517.2	.05094	9.6846	.00550	128.79	65.53	.00295	1.03466	.7044
200.	10.2409	2860.6	.04863	9.6442	.00491	139.69	69.84	.00350	1.03120	.7016
220.	9.3295	3201.2	.04688	9.6075	.00443	150.36	74.11	.00409	1.02840	.6995
240.	8.5719	3536.3	.04557	9.5739	.00405	160.70	78.32	.00471	1.02607	.6977
260.	7.9313	3865.6	.04457	9.5434	.00373	170.68	82.46	.00538	1.02410	.6961
280.	7.3821	4189.0	.04382	9.5155	.00346	180.30	86.53	.00607	1.02242	.6947
300.	6.9007	4513.8	.04323	9.5020	.00322	189.58	90.52	.00681	1.02095	.6932
350.	5.9473	5284.6	.04231	9.4431	.00276	211.47	100.22	.00879	1.01803	.6904
400.	5.2280	6035.5	.04180	9.3954	.00241	231.89	109.54	.01096	1.01584	.6885
450.	4.6654	6775.2	.04148	9.3564	.00215	251.27	118.51	.01331	1.01413	.6872
500.	4.2127	7514.4	.04123	9.3241	.00194	269.90	127.19	.01583	1.01275	.6866
550.	3.8406	8251.8	.04102	9.2969	.00177	288.02	135.60	.01853	1.01162	.6860
600.	3.5291	8992.6	.04083	9.2738	.00162	305.79	143.78	.02139	1.01067	.6856
650.	3.2645	9737.5	.04064	9.2539	.00150	323.33	151.75	.02443	1.00987	.6851
700.	3.0369	10491.5	.04043	9.2366	.00139	340.74	159.53	.02762	1.00918	.6848
750.	2.8391	11254.1	.04020	9.2215	.00130	358.07	167.14	.03097	1.00858	.6844
800.	2.6654	12028.0	.03995	9.2081	.00122	375.39	174.60	.03447	1.00805	.6841
850.	2.5119	12814.9	.03967	9.1963	.00115	392.74	181.92	.03812	1.00759	.6839
900.	2.3751	13616.2	.03937	9.1857	.00109	410.13	189.10	.04191	1.00717	.6839
950.	2.2524	14432.6	.03904	9.1762	.00103	427.60	196.17	.04584	1.00680	.6839
1000.	2.1418	15264.9	.03870	9.1675	.00098	445.16	203.13	.04991	1.00647	.6841
1100.	1.9503	16966.5	.03800	9.1526	.00089	475.56	216.75	.05787	1.00589	.6914
1200.	1.7902	18726.8	.03727	9.1401	.00082	511.00	230.02	.06686	1.00540	.6918
1300.	1.6544	20545.0	.03653	9.1294	.00076	546.89	242.96	.07638	1.00499	.6922
1400.	1.5378	22418.4	.03580	9.1203	.00070	583.18	255.61	.08640	1.00464	.6926
1500.	1.4366	24342.7	.03509	9.1123	.00066	619.82	268.01	.09691	1.00433	.6930
1600.	1.3478	26297.9	.03443	9.1053	.00062	656.38	280.15	.10792	1.00407	.6934
1700.	1.2694	28294.2	.03381	9.0991	.00058	693.25	292.06	.11944	1.00383	.6935
1800.	1.1996	30336.0	.03320	9.0935	.00055	730.69	303.75	.13148	1.00362	.6933
2000.	1.0807	34606.8	.03201	9.0836	.00050	809.63	326.50	.15733	1.00326	.6913
2200.	.9831	39333.4	.03065	9.0740	.00045	901.85	344.90	.18626	1.00297	.6781
2400.	.9013	44871.7	.02897	9.0626	.00041	1021.30	366.27	.21973	1.00272	.6658
2600.	.8315	51777.1	.02685	9.0464	.00038	1189.01	387.25	.25987	1.00251	.6452
2800.	.7707	60768.9	.02430	9.0209	.00036	1431.90	408.01	.30893	1.00232	.6169
3000.	.7168	72666.6	.02149	8.9806	.00033	1780.65	428.79	.36848	1.00216	.5845

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

9.50 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 16.671	.01225	1.7227	1.020	224.6	341.0	14.287	5.06	6.57	1496.
17.	.01227	1.7040	1.020	226.5	343.1	14.416	5.11	6.68	1492.
18.	.01237	1.6473	1.017	232.5	350.0	14.807	5.28	7.00	1479.
19.	.01246	1.5892	1.008	238.7	357.1	15.193	5.43	7.32	1463.
20.	.01256	1.5279	1.006	245.2	364.6	15.577	5.57	7.66	1450.
22.	.01278	1.4161	.9922	259.1	380.6	16.340	5.81	8.30	1423.
24.	.01302	1.3147	.9693	274.1	397.8	17.089	5.99	8.90	1397.
26.	.01328	1.2132	.9416	290.0	416.2	17.823	6.14	9.50	1369.
28.	.01357	1.1116	.9088	306.9	435.8	18.548	6.28	10.11	1338.
30.	.01389	1.0153	.8720	324.7	456.6	19.266	6.38	10.71	1306.
32.	.01423	.9233	.8317	343.4	478.6	19.977	6.47	11.33	1271.
34.	.01462	.8366	.7885	363.0	501.9	20.682	6.54	11.93	1236.
36.	.01504	.7572	.7435	383.5	526.3	21.381	6.59	12.53	1200.
38.	.01551	.6838	.6980	404.7	552.0	22.074	6.63	13.14	1164.
40.	.01602	.6194	.6528	426.6	578.8	22.762	6.65	13.71	1130.
42.	.01659	.5637	.6081	449.2	606.8	23.444	6.66	14.24	1098.
44.	.01721	.5140	.5645	472.3	635.8	24.118	6.67	14.75	1066.
46.	.01789	.4723	.5226	495.3	665.2	24.772	6.72	15.23	1035.
48.	.01862	.4371	.4830	519.1	696.1	25.429	6.75	15.63	1006.
50.	.01942	.4084	.4461	543.2	727.7	26.074	6.77	15.96	981.
55.	.02164	.3614	.3666	603.2	808.8	27.620	6.81	16.40	933.
60.	.02413	.3429	.3048	661.6	890.9	29.050	6.80	16.27	906.
65.	.02679	.3431	.2575	716.7	971.2	30.334	6.79	15.80	894.
70.	.02950	.3546	.2216	768.5	1048.8	31.485	6.79	15.23	892.
75.	.03221	.3716	.1942	817.5	1123.5	32.517	6.81	14.71	896.
80.	.03492	.3915	.1728	864.4	1196.1	33.453	6.87	14.30	903.
90.	.04024	.4365	.1418	953.8	1336.0	35.103	7.04	13.75	924.
100.	.04543	.4847	.1206	1040.2	1471.8	36.534	7.26	13.45	947.
110.	.05051	.5337	.1051	1127.5	1607.3	37.823	7.61	13.41	970.
120.	.05548	.5825	.0933	1214.0	1741.1	38.988	7.88	13.39	995.
140.	.06518	.6786	.0764	1390.4	2009.6	41.058	8.40	13.51	1045.
160.	.07446	.7687	.0646	1571.8	2279.3	42.856	8.84	13.66	1090.
180.	.08372	.8598	.0564	1759.1	2554.4	44.477	9.21	13.87	1138.
200.	.09285	.9492	.0500	1951.4	2833.5	45.947	9.51	14.05	1185.
220.	.10190	1.0374	.0450	2148.0	3116.1	47.294	9.74	14.21	1230.
240.	.11089	1.1246	.0410	2348.0	3401.5	48.536	9.93	14.33	1274.
260.	.11982	1.2111	.0376	2550.6	3689.0	49.687	10.07	14.42	1317.
280.	.12872	1.2969	.0347	2755.3	3978.1	50.758	10.17	14.49	1359.
300.	.13769	1.3852	.0323	2962.6	4270.7	51.764	10.25	14.53	1401.
350.	.15971	1.5962	.0275	3481.2	4998.4	54.009	10.35	14.57	1499.
400.	.18163	1.8056	.0240	4001.9	5727.4	55.956	10.39	14.58	1592.
450.	.20349	2.0140	.0212	4523.2	6456.4	57.672	10.40	14.57	1680.
500.	.22532	2.2219	.0191	5044.6	7185.1	59.207	10.41	14.57	1764.
550.	.24711	2.4292	.0173	5566.1	7913.7	60.596	10.42	14.57	1843.
600.	.26888	2.6364	.0159	6088.3	8642.7	61.862	10.44	14.58	1919.
650.	.29064	2.8433	.0146	6611.1	9372.2	63.026	10.46	14.60	1992.
700.	.31239	3.0500	.0136	7135.2	10103.0	64.116	10.49	14.63	2062.
750.	.33414	3.2566	.0127	7661.2	10835.5	65.128	10.53	14.66	2130.
800.	.35587	3.4632	.0119	8189.2	11570.0	66.077	10.58	14.71	2195.
850.	.37760	3.6697	.0112	8719.8	12307.1	66.970	10.63	14.77	2257.
900.	.39933	3.8761	.0106	9253.5	13047.1	67.815	10.70	14.83	2318.
950.	.42105	4.0825	.0100	9790.5	13790.6	68.617	10.78	14.91	2376.
1000.	.44278	4.2889	.0095	10331.3	14537.7	69.383	10.86	14.99	2433.
1100.	.48621	4.7015	.0086	11427.3	16046.3	70.810	11.04	15.17	2541.
1200.	.52964	5.1141	.0079	12542.5	17574.2	72.132	11.24	15.37	2644.
1300.	.57307	5.5267	.0073	13678.4	19122.6	73.371	11.46	15.58	2742.
1400.	.61650	5.9392	.0068	14835.7	20692.4	74.541	11.68	15.80	2835.
1500.	.65992	6.3516	.0063	16014.8	22284.0	75.653	11.90	16.03	2924.
1600.	.70334	6.7641	.0059	17214.6	23896.3	76.687	12.12	16.24	3011.
1700.	.74676	7.1766	.0056	18436.2	25530.5	77.673	12.34	16.46	3095.
1800.	.79019	7.5890	.0053	19679.9	27186.7	78.619	12.55	16.68	3176.
2000.	.87708	8.4139	.0047	22235.9	30568.1	80.411	13.01	17.14	3330.
2200.	.96412	9.2387	.0043	24887.4	34046.5	82.060	13.57	17.72	3474.
2400.	1.05154	10.0635	.0040	27672.6	37662.2	83.628	14.34	18.54	3607.
2600.	1.13977	10.8884	.0037	30652.6	41480.4	85.155	15.46	19.76	3730.
2800.	1.22953	11.7132	.0034	33919.8	45600.3	86.686	17.08	21.56	3844.
3000.	1.32191	12.5380	.0032	37598.7	50156.8	88.266	19.33	24.11	3953.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

9.50 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 16.671	81.6656	905.3	.24715	140.6852	.00725	104.69	313.87	.00070	1.26800	1.9686
17.	81.4695	908.8	.24482	138.8240	.00735	106.57	302.15	.00071	1.26730	1.8928
18.	80.8617	917.7	.23825	133.1996	.00763	111.57	271.36	.00071	1.26515	1.7036
19.	80.2445	925.9	.23126	127.5240	.00791	115.24	246.48	.00071	1.26297	1.5656
20.	79.5989	926.4	.22684	121.6219	.00827	118.70	225.72	.00070	1.26068	1.4573
22.	78.2414	927.3	.21843	110.8006	.00895	125.58	193.41	.00070	1.25589	1.2789
24.	76.8010	927.0	.21063	100.9666	.00960	129.79	169.53	.00068	1.25082	1.1624
26.	75.2878	921.2	.20355	91.3424	.01031	132.02	151.24	.00066	1.24550	1.0878
28.	73.6931	911.0	.19650	81.9185	.01109	132.73	136.70	.00064	1.23992	1.0409
30.	72.0176	898.3	.18974	73.1210	.01193	132.35	124.80	.00062	1.23407	1.0102
32.	70.2578	883.3	.18302	64.8701	.01282	130.18	114.81	.00059	1.22795	.9988
34.	68.4157	866.3	.17634	57.2356	.01378	127.56	106.24	.00056	1.22156	.9939
36.	66.4933	848.8	.16969	50.3499	.01477	124.63	98.76	.00054	1.21491	.9934
38.	64.4950	830.1	.16325	44.1028	.01583	121.46	92.16	.00052	1.20803	.9969
40.	62.4233	812.0	.15733	38.6660	.01688	118.14	86.27	.00050	1.20092	1.0011
42.	60.2913	795.8	.15148	33.9864	.01789	114.72	80.99	.00048	1.19364	1.0052
44.	58.1125	780.5	.14559	29.8702	.01890	111.33	76.26	.00047	1.18623	1.0104
46.	55.9058	769.5	.13912	26.4061	.01979	108.03	72.04	.00046	1.17875	1.0155
48.	53.6920	759.7	.13327	23.4696	.02058	104.87	68.29	.00045	1.17128	1.0181
50.	51.4919	752.5	.12788	21.0301	.02121	102.19	64.99	.00045	1.16389	1.0152
55.	46.2002	746.7	.11648	16.6957	.02196	96.33	58.54	.00046	1.14624	.9966
60.	41.4336	758.4	.10817	14.2090	.02145	91.84	54.28	.00049	1.13050	.9615
65.	37.3324	785.8	.10166	12.8079	.02011	89.13	51.67	.00054	1.11708	.9161
70.	33.9005	825.8	.09632	12.0198	.01844	87.31	50.23	.00061	1.10593	.8759
75.	31.0424	873.9	.09180	11.5349	.01683	85.55	49.55	.00067	1.09671	.8521
80.	28.6398	928.2	.08787	11.2118	.01541	85.14	49.37	.00075	1.08900	.8294
90.	24.8533	1051.9	.08108	10.8482	.01307	88.04	49.91	.00093	1.07692	.7797
100.	22.0112	1190.5	.07541	10.6683	.01130	91.31	51.16	.00111	1.06792	.7538
110.	19.7998	1348.7	.06977	10.5676	.00994	95.17	52.17	.00129	1.06095	.7352
120.	18.0248	1507.8	.06567	10.4988	.00888	99.10	53.67	.00148	1.05538	.7253
140.	15.3414	1841.6	.05928	10.4111	.00733	108.27	57.37	.00188	1.04700	.7158
160.	13.4294	2182.1	.05444	10.3235	.00626	118.55	61.49	.00233	1.04106	.7087
180.	11.9452	2527.4	.05124	10.2704	.00549	129.30	65.75	.00281	1.03646	.7053
200.	10.7698	2871.2	.04888	10.2230	.00489	140.09	70.02	.00333	1.03283	.7024
220.	9.8132	3212.3	.04710	10.1804	.00442	150.69	74.26	.00389	1.02988	.7002
240.	9.0180	3547.8	.04576	10.1420	.00404	160.98	78.44	.00448	1.02744	.6983
260.	8.3455	3877.6	.04475	10.1072	.00372	170.92	82.57	.00511	1.02537	.6967
280.	7.7688	4201.4	.04398	10.0756	.00345	180.50	86.62	.00577	1.02361	.6953
300.	7.2628	4527.2	.04337	10.0607	.00321	189.75	90.61	.00647	1.02206	.6936
350.	6.2614	5298.4	.04243	9.9944	.00275	211.60	100.29	.00835	1.01899	.6907
400.	5.5056	6049.7	.04190	9.9409	.00241	231.99	109.59	.01040	1.01669	.6887
450.	4.9141	6789.6	.04158	9.8972	.00215	251.35	118.56	.01264	1.01489	.6874
500.	4.4382	7529.0	.04131	9.8611	.00194	269.97	127.23	.01503	1.01344	.6868
550.	4.0468	8266.5	.04110	9.8307	.00176	288.08	135.63	.01758	1.01225	.6862
600.	3.7191	9007.5	.04090	9.8048	.00162	305.84	143.81	.02030	1.01125	.6857
650.	3.4406	9752.4	.04070	9.7826	.00150	323.38	151.77	.02318	1.01041	.6852
700.	3.2011	10506.5	.04048	9.7633	.00139	340.78	159.55	.02620	1.00968	.6848
750.	2.9928	11269.2	.04025	9.7465	.00130	358.11	167.16	.02938	1.00905	.6845
800.	2.8100	12043.2	.03999	9.7316	.00122	375.43	174.62	.03270	1.00849	.6842
850.	2.6483	12830.2	.03971	9.7184	.00115	392.77	181.93	.03616	1.00800	.6840
900.	2.5042	13631.5	.03941	9.7066	.00109	410.16	189.12	.03975	1.00757	.6839
950.	2.3750	14448.1	.03908	9.6960	.00103	427.62	196.19	.04348	1.00717	.6840
1000.	2.2585	15280.5	.03873	9.6864	.00098	445.18	203.15	.04733	1.00682	.6841
1100.	2.0567	16982.2	.03803	9.6697	.00089	475.56	216.77	.05487	1.00621	.6915
1200.	1.8881	18742.8	.03730	9.6558	.00082	511.00	230.03	.06340	1.00570	.6918
1300.	1.7450	20561.2	.03656	9.6439	.00076	546.89	242.97	.07241	1.00527	.6922
1400.	1.6221	22434.8	.03583	9.6337	.00070	583.18	255.62	.08191	1.00490	.6926
1500.	1.5153	24359.3	.03511	9.6249	.00066	619.81	268.01	.09187	1.00457	.6931
1600.	1.4218	26314.5	.03445	9.6171	.00062	656.37	280.16	.10231	1.00429	.6934
1700.	1.3391	28310.7	.03383	9.6102	.00058	693.22	292.07	.11322	1.00404	.6935
1800.	1.2655	30351.7	.03322	9.6040	.00055	730.62	303.76	.12462	1.00382	.6934
2000.	1.1401	34617.6	.03203	9.5930	.00050	809.36	326.51	.14911	1.00344	.6914
2200.	1.0372	39329.6	.03068	9.5825	.00045	901.00	344.90	.17647	1.00313	.6783
2400.	.9510	44833.2	.02903	9.5703	.00041	1019.12	366.27	.20808	1.00287	.6663
2600.	.8774	51668.9	.02694	9.5531	.00038	1184.18	387.24	.24590	1.00265	.6462
2800.	.8133	60537.5	.02443	9.5265	.00036	1422.41	407.99	.29206	1.00245	.6183
3000.	.7565	72237.6	.02165	9.4848	.00033	1763.71	428.75	.34806	1.00228	.5862

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

10.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 16.808	.01221	1.7491	1.024	225.1	347.2	14.297	5.07	6.58	1506.
17.	.01223	1.7383	1.024	226.2	348.5	14.372	5.11	6.64	1503.
18.	.01232	1.6821	1.021	232.1	355.3	14.761	5.27	6.97	1491.
19.	.01241	1.6243	1.012	238.3	362.4	15.144	5.42	7.27	1476.
20.	.01251	1.5672	1.011	244.7	369.8	15.526	5.57	7.61	1464.
22.	.01272	1.4503	.9983	258.5	385.7	16.284	5.80	8.25	1436.
24.	.01296	1.3481	.9764	273.2	402.8	17.027	5.99	8.84	1410.
26.	.01321	1.2515	.9495	288.9	421.1	17.756	6.14	9.41	1385.
28.	.01349	1.1494	.9179	305.6	440.5	18.474	6.28	10.01	1354.
30.	.01379	1.0532	.8822	323.1	461.1	19.185	6.38	10.60	1322.
32.	.01413	.9630	.8431	341.6	482.9	19.888	6.47	11.19	1290.
34.	.01449	.8772	.8012	360.9	505.8	20.584	6.54	11.77	1256.
36.	.01490	.7978	.7574	381.0	529.9	21.273	6.60	12.34	1222.
38.	.01534	.7254	.7129	401.8	555.2	21.956	6.64	12.90	1187.
40.	.01582	.6588	.6686	423.3	581.5	22.631	6.66	13.45	1154.
42.	.01635	.6014	.6249	445.4	609.0	23.300	6.67	13.96	1122.
44.	.01693	.5501	.5821	468.0	637.4	23.961	6.69	14.46	1091.
46.	.01757	.5076	.5408	490.6	666.2	24.601	6.73	14.91	1060.
48.	.01825	.4709	.5016	513.9	696.4	25.244	6.76	15.30	1032.
50.	.01899	.4405	.4649	537.5	727.4	25.876	6.79	15.53	1007.
55.	.02104	.3890	.3850	596.6	806.9	27.392	6.83	16.10	958.
60.	.02334	.3655	.3218	654.4	887.8	28.801	6.81	16.07	929.
65.	.02580	.3615	.2729	709.3	967.4	30.074	6.80	15.72	914.
70.	.02835	.3702	.2352	761.3	1044.8	31.222	6.80	15.21	910.
75.	.03090	.3855	.2062	810.6	1119.6	32.255	6.83	14.73	912.
80.	.03345	.4039	.1835	857.8	1192.2	33.192	6.88	14.34	918.
90.	.03848	.4468	.1505	947.8	1332.7	34.847	7.05	13.81	935.
100.	.04342	.4938	.1278	1034.9	1469.0	36.284	7.27	13.51	958.
110.	.04824	.5422	.1113	1122.6	1605.1	37.579	7.61	13.46	979.
120.	.05297	.5907	.0987	1209.6	1739.4	38.748	7.89	13.44	1003.
140.	.06221	.6861	.0807	1386.7	2008.7	40.824	8.41	13.55	1052.
160.	.07104	.7761	.0682	1568.8	2279.2	42.629	8.85	13.69	1096.
180.	.07985	.8673	.0595	1756.5	2554.9	44.253	9.22	13.90	1144.
200.	.08854	.9568	.0528	1949.1	2834.5	45.726	9.51	14.07	1190.
220.	.09715	1.0451	.0475	2146.0	3117.5	47.074	9.75	14.23	1235.
240.	.10570	1.1324	.0432	2346.2	3403.2	48.317	9.93	14.35	1279.
260.	.11419	1.2190	.0396	2549.0	3691.0	49.470	10.07	14.44	1322.
280.	.12265	1.3049	.0366	2753.8	3980.3	50.542	10.17	14.50	1364.
300.	.13119	1.3936	.0340	2961.4	4273.2	51.549	10.25	14.54	1406.
350.	.15212	1.6046	.0290	3480.2	5001.4	53.794	10.35	14.58	1503.
400.	.17295	1.8141	.0252	4001.1	5730.7	55.742	10.39	14.59	1596.
450.	.19373	2.0226	.0224	4522.6	6459.9	57.460	10.40	14.58	1684.
500.	.21446	2.2304	.0201	5044.1	7188.8	58.995	10.41	14.58	1767.
550.	.23517	2.4378	.0182	5565.7	7917.4	60.384	10.42	14.58	1846.
600.	.25586	2.6449	.0167	6088.0	8646.6	61.650	10.44	14.59	1922.
650.	.27653	2.8518	.0154	6610.8	9376.1	62.814	10.45	14.60	1995.
700.	.29720	3.0586	.0143	7135.0	10107.0	63.904	10.49	14.63	2065.
750.	.31785	3.2652	.0133	7661.0	10839.5	64.917	10.53	14.66	2133.
800.	.33850	3.4718	.0125	8189.0	11574.0	65.865	10.58	14.71	2197.
850.	.35915	3.6783	.0118	8719.7	12311.2	66.758	10.63	14.77	2260.
900.	.37979	3.8847	.0111	9253.4	13051.3	67.603	10.70	14.83	2320.
950.	.40043	4.0911	.0105	9790.5	13794.7	68.406	10.78	14.91	2379.
1000.	.42106	4.2974	.0100	10331.2	14541.9	69.171	10.86	14.99	2435.
1100.	.46233	4.7101	.0091	11427.2	16050.5	70.599	11.04	15.17	2544.
1200.	.50359	5.1227	.0083	12542.5	17578.4	71.920	11.24	15.37	264[illegible]
1300.	.54485	5.5352	.0077	13678.4	19126.9	73.159	11.46	15.58	2744.
1400.	.58610	5.9477	.0071	14835.7	20696.7	74.330	11.68	15.80	2837.
1500.	.62735	6.3601	.0067	16014.8	22288.3	75.442	11.90	16.03	2926.
1600.	.66860	6.7726	.0062	17214.6	23900.6	76.476	12.12	16.24	3013.
1700.	.70985	7.1850	.0059	18436.2	25534.8	77.462	12.34	16.46	3096.
1800.	.75111	7.5975	.0056	19679.8	27190.9	78.407	12.55	16.68	3177.
2000.	.83366	8.4223	.0050	22235.5	30572.0	80.199	13.00	17.14	3332.
2200.	.91634	9.2471	.0045	24885.8	34049.2	81.848	13.56	17.71	3476.
2400.	.99937	10.0720	.0042	27668.2	37661.9	83.414	14.32	18.52	3609.
2600.	1.08316	10.8968	.0038	30641.9	41473.4	84.939	15.42	19.71	3732.
2800.	1.16836	11.7216	.0036	33896.7	45580.4	86.465	17.00	21.47	3847.
3000.	1.25599	12.5464	.0033	37554.2	50114.1	88.037	19.21	23.97	3955.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

10.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DV)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 16.808	81.8729	919.9	.24645	143.2003	.00715	106.05	316.91	.00071	1.26874	1.9657
17.	81.7600	922.0	.24510	142.1202	.00720	107.14	309.94	.00071	1.26834	1.9212
18.	81.1621	931.5	.23860	136.5241	.00748	112.24	278.08	.00071	1.26621	1.7260
19.	80.5558	939.9	.23167	130.8463	.00774	115.98	252.38	.00071	1.26407	1.5824
20.	79.9218	942.6	.22727	125.2542	.00807	119.53	230.97	.00071	1.26182	1.4701
22.	78.5887	941.9	.21893	113.9783	.00876	126.57	197.68	.00070	1.25711	1.2885
24.	77.1767	941.9	.21121	104.0384	.00939	130.92	173.15	.00069	1.25214	1.1691
26.	75.6908	939.1	.20418	94.7233	.01002	133.27	154.38	.00067	1.24692	1.0904
28.	74.1366	929.4	.19723	85.2159	.01077	134.11	139.55	.00065	1.24147	1.0417
30.	72.5015	917.6	.19059	76.3574	.01155	133.85	127.43	.00063	1.23576	1.0093
32.	70.7876	904.5	.18399	68.1673	.01237	131.79	117.27	.00060	1.22979	.9955
34.	68.9988	889.1	.17747	60.5268	.01324	129.27	108.59	.00057	1.22358	.9886
36.	67.1359	872.8	.17096	53.5628	.01414	126.45	101.05	.00055	1.21713	.9862
38.	65.2037	856.0	.16466	47.2967	.01507	123.39	94.40	.00053	1.21047	.9870
40.	63.2056	837.8	.15886	41.6392	.01606	120.18	88.48	.00051	1.20360	.9904
42.	61.1498	821.8	.15317	36.7751	.01699	116.87	83.17	.00049	1.19657	.9938
44.	59.0530	806.9	.14743	32.4879	.01792	113.57	78.42	.00048	1.18942	.9981
46.	56.9271	796.7	.14110	28.8948	.01872	110.35	74.16	.00047	1.18221	1.0021
48.	54.7942	787.3	.13536	25.8049	.01944	107.26	70.37	.00046	1.17499	1.0041
50.	52.6712	780.0	.13004	23.2021	.02004	104.44	67.02	.00046	1.16785	1.0029
55.	47.5332	773.3	.11866	18.4927	.02082	98.63	60.39	.00046	1.15067	.9858
60.	42.8456	782.3	.11023	15.6610	.02055	94.09	55.91	.00049	1.13515	.9551
65.	38.7532	806.9	.10355	14.0104	.01948	91.27	53.06	.00054	1.12172	.9138
70.	35.2794	844.5	.09801	13.0614	.01801	89.29	51.41	.00060	1.11040	.8756
75.	32.3603	891.0	.09331	12.4759	.01653	87.38	50.57	.00066	1.10095	.8523
80.	29.8978	943.6	.08922	12.0748	.01520	86.83	50.28	.00073	1.09303	.8303
90.	25.9853	1065.0	.08218	11.6098	.01296	89.51	50.65	.00090	1.08052	.7812
100.	23.0330	1202.1	.07630	11.3739	.01124	92.61	51.78	.00107	1.07115	.7554
110.	20.7294	1359.6	.07052	11.2403	.00990	96.46	52.78	.00124	1.06387	.7367
120.	18.8773	1518.3	.06630	11.1500	.00885	100.21	54.17	.00142	1.05805	.7266
140.	16.0754	1851.5	.05974	11.0295	.00732	109.11	57.73	.00180	1.04929	.7170
160.	14.0768	2192.1	.05479	10.9245	.00625	119.20	61.77	.00223	1.04306	.7096
180.	12.5242	2537.8	.05153	10.8616	.00548	129.81	65.96	.00269	1.03825	.7061
200.	11.2944	2882.1	.04913	10.8066	.00488	140.50	70.20	.00318	1.03445	.7032
220.	10.2934	3223.6	.04732	10.7578	.00441	151.03	74.41	.00371	1.03136	.7010
240.	9.4610	3559.5	.04596	10.7141	.00403	161.26	78.57	.00428	1.02880	.6990
260.	8.7570	3889.7	.04492	10.6747	.00371	171.15	82.68	.00487	1.02664	.6973
280.	8.1531	4213.8	.04414	10.6392	.00344	180.71	86.72	.00550	1.02478	.6959
300.	7.6226	4540.6	.04352	10.6229	.00320	189.93	90.70	.00617	1.02316	.6941
350.	6.5738	5312.3	.04255	10.5486	.00274	211.73	100.36	.00795	1.01995	.6911
400.	5.7819	6063.9	.04201	10.4889	.00241	232.10	109.65	.00991	1.01753	.6890
450.	5.1619	6804.1	.04167	10.4403	.00214	251.43	118.60	.01203	1.01564	.6876
500.	4.6628	7543.7	.04139	10.4000	.00193	270.04	127.27	.01430	1.01412	.6869
550.	4.2523	8281.3	.04117	10.3662	.00176	288.14	135.67	.01674	1.01287	.6863
600.	3.9084	9022.4	.04096	10.3375	.00162	305.90	143.84	.01932	1.01183	.6858
650.	3.6162	9767.4	.04076	10.3129	.00149	323.43	151.80	.02205	1.01094	.6853
700.	3.3648	10521.6	.04054	10.2915	.00139	340.82	159.58	.02493	1.01017	.6849
750.	3.1461	11284.3	.04030	10.2728	.00130	358.15	167.18	.02795	1.00951	.6845
800.	2.9542	12058.4	.04004	10.2563	.00122	375.46	174.64	.03110	1.00893	.6842
850.	2.7844	12845.5	.03976	10.2417	.00115	392.80	181.95	.03439	1.00841	.6840
900.	2.6330	13646.9	.03945	10.2286	.00109	410.19	189.14	.03781	1.00796	.6839
950.	2.4973	14463.6	.03912	10.2168	.00103	427.65	196.20	.04135	1.00754	.6840
1000.	2.3749	15296.1	.03877	10.2062	.00098	445.21	203.16	.04501	1.00717	.6841
1100.	2.1630	16998.0	.03807	10.1877	.00089	475.56	216.78	.05217	1.00653	.6915
1200.	1.9857	18758.8	.03733	10.1723	.00082	511.00	230.04	.06028	1.00600	.6919
1300.	1.8354	20577.4	.03659	10.1592	.00076	546.89	242.98	.06885	1.00554	.6922
1400.	1.7062	22451.3	.03585	10.1479	.00070	583.18	255.63	.07787	1.00515	.6927
1500.	1.5940	24376.0	.03513	10.1381	.00066	619.81	268.02	.08734	1.00481	.6931
1600.	1.4957	26331.2	.03447	10.1295	.00062	656.36	280.16	.09725	1.00451	.6934
1700.	1.4087	28327.1	.03385	10.1219	.00058	693.19	292.08	.10762	1.00425	.6936
1800.	1.3314	30367.5	.03324	10.1150	.00055	730.56	303.77	.11845	1.00402	.6934
2000.	1.1995	34629.0	.03205	10.1029	.00049	809.11	326.51	.14171	1.00362	.6915
2200.	1.0913	39327.5	.03072	10.0914	.00045	900.22	344.90	.16767	1.00329	.6786
2400.	1.0006	44799.0	.02908	10.0783	.00041	1017.11	366.26	.19760	1.00302	.6669
2600.	.9232	51570.5	.02702	10.0602	.00038	1179.72	387.23	.23336	1.00278	.6471
2800.	.8559	60325.0	.02454	10.0325	.00036	1413.64	407.97	.27692	1.00258	.6197
3000.	.7962	71842.6	.02179	9.9893	.00033	1748.06	428.71	.32975	1.00240	.5879

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

11.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 17.079	.01215	1.8010	1.031	226.1	359.7	14.316	5.11	6.60	1525.
18.	.01223	1.7504	1.030	231.4	366.0	14.671	5.26	6.89	1514.
19.	.01232	1.6954	1.026	237.5	373.0	15.052	5.41	7.21	1502.
20.	.01242	1.6373	1.020	243.8	380.3	15.428	5.55	7.51	1488.
22.	.01262	1.5254	1.010	257.2	396.0	16.175	5.79	8.14	1464.
24.	.01284	1.4193	.9902	271.6	412.8	16.908	5.99	8.72	1438.
26.	.01308	1.3244	.9641	287.0	430.8	17.627	6.14	9.26	1413.
28.	.01334	1.2252	.9349	303.2	450.0	18.333	6.28	9.83	1385.
30.	.01362	1.1283	.9013	320.3	470.2	19.031	6.39	10.40	1355.
32.	.01393	1.0396	.8644	338.3	491.5	19.720	6.48	10.95	1325.
34.	.01427	.9546	.8248	357.0	513.9	20.400	6.56	11.49	1293.
36.	.01463	.8747	.7832	376.5	537.5	21.072	6.62	12.02	1261.
38.	.01503	.8011	.7406	396.6	562.0	21.736	6.66	12.54	1228.
40.	.01547	.7358	.6979	417.4	587.6	22.391	6.68	13.02	1197.
42.	.01594	.6753	.6558	438.7	614.1	23.038	6.70	13.50	1167.
44.	.01646	.6233	.6146	460.5	641.5	23.676	6.71	13.93	1138.
46.	.01701	.5768	.5745	482.2	669.3	24.293	6.76	14.38	1108.
48.	.01761	.5382	.5361	504.8	698.5	24.914	6.79	14.74	1081.
50.	.01825	.5048	.4999	527.5	728.3	25.522	6.81	15.06	1056.
55.	.02002	.4445	.4196	584.8	805.1	26.985	6.85	15.59	1006.
60.	.02202	.4130	.3544	641.5	883.6	28.354	6.84	15.59	973.
65.	.02416	.4010	.3027	695.9	961.7	29.603	6.83	15.50	954.
70.	.02641	.4032	.2621	748.0	1038.4	30.740	6.83	15.15	945.
75.	.02868	.4146	.2301	797.6	1113.1	31.771	6.86	14.74	944.
80.	.03097	.4308	.2048	845.3	1185.9	32.711	6.90	14.37	947.
90.	.03550	.4693	.1679	936.4	1326.9	34.373	7.07	13.88	960.
100.	.03997	.5136	.1425	1024.5	1464.2	35.819	7.29	13.61	979.
110.	.04436	.5604	.1239	1113.2	1601.2	37.123	7.63	13.56	998.
120.	.04867	.6079	.1097	1201.0	1736.4	38.300	7.90	13.53	1020.
140.	.05710	.7027	.0895	1379.5	2007.5	40.390	8.42	13.63	1066.
160.	.06530	.7958	.0758	1563.0	2281.3	42.217	8.86	13.79	1113.
180.	.07317	.8825	.0657	1751.4	2556.2	43.835	9.23	13.95	1155.
200.	.08109	.9722	.0583	1944.6	2836.7	45.313	9.52	14.12	1201.
220.	.08894	1.0607	.0524	2142.0	3120.4	46.665	9.76	14.26	1245.
240.	.09673	1.1482	.0476	2342.7	3406.7	47.911	9.94	14.38	1289.
260.	.10447	1.2349	.0437	2545.8	3695.0	49.065	10.08	14.46	1331.
280.	.11217	1.3210	.0403	2750.9	3984.8	50.139	10.18	14.52	1373.
300.	.11996	1.4107	.0375	2958.9	4278.5	51.148	10.26	14.55	1415.
350.	.13901	1.6216	.0319	3478.3	5007.4	53.396	10.35	14.59	1512.
400.	.15796	1.8312	.0278	3999.6	5737.3	55.346	10.39	14.59	1604.
450.	.17686	2.0397	.0246	4521.5	6466.9	57.064	10.40	14.58	1691.
500.	.19572	2.2476	.0221	5043.2	7196.0	58.600	10.41	14.58	1774.
550.	.21455	2.4550	.0201	5564.9	7924.9	59.990	10.42	14.58	1853.
600.	.23336	2.6621	.0184	6087.3	8654.3	61.256	10.44	14.59	1929.
650.	.25215	2.8690	.0170	6610.3	9384.0	62.420	10.46	14.60	2001.
700.	.27094	3.0757	.0157	7134.6	10114.9	63.511	10.49	14.63	2071.
750.	.28972	3.2824	.0147	7660.7	10847.6	64.523	10.53	14.67	2138.
800.	.30850	3.4889	.0138	8188.7	11582.2	65.471	10.58	14.71	2203.
850.	.32727	3.6954	.0130	8719.5	12319.4	66.365	10.64	14.77	2265.
900.	.34603	3.9018	.0122	9253.2	13059.5	67.210	10.70	14.83	2325.
950.	.36480	4.1082	.0116	9790.3	13803.0	68.012	10.78	14.91	2384.
1000.	.38356	4.3145	.0110	10331.1	14550.2	68.778	10.86	14.99	2440.
1100.	.42107	4.7271	.0100	11427.2	16059.0	70.205	11.04	15.17	2548.
1200.	.45858	5.1397	.0092	12542.5	17586.9	71.527	11.24	15.37	2651.
1300.	.49609	5.5522	.0085	13678.4	19135.4	72.766	11.46	15.58	2748.
1400.	.53359	5.9646	.0079	14835.8	20705.3	73.937	11.68	15.80	2841.
1500.	.57109	6.3771	.0073	16014.8	22296.9	75.049	11.90	16.03	2930.
1600.	.60860	6.7895	.0069	17214.7	23909.2	76.082	12.12	16.24	3017.
1700.	.64610	7.2019	.0065	18436.3	25543.3	77.068	12.33	16.46	3100.
1800.	.68360	7.6143	.0061	19679.8	27199.4	78.014	12.55	16.68	3181.
2000.	.75864	8.4392	.0055	22234.8	30579.8	79.805	13.00	17.13	3335.
2200.	.83380	9.2640	.0050	24883.1	34054.9	81.453	13.54	17.69	3479.
2400.	.90926	10.0888	.0046	27660.3	37662.2	83.017	14.28	18.48	3613.
2600.	.98538	10.9136	.0042	30622.6	41461.7	84.537	15.34	19.63	3736.
2800.	1.06273	11.7384	.0039	33855.5	45545.5	86.055	16.86	21.32	3851.
3000.	1.14217	12.5631	.0037	37474.7	50038.6	87.613	18.98	23.71	3960.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

11.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 17.079	82.2793	948.8	.24513	148.1880	.00696	108.72	322.98	.00072	1.27018	1.9612
18.	81.7448	958.3	.23926	143.0836	.00720	113.54	291.85	.00073	1.26828	1.7723
19.	81.1480	966.2	.23356	137.5798	.00746	117.42	264.22	.00072	1.26617	1.6218
20.	80.5457	971.0	.22814	131.8769	.00774	121.15	241.65	.00072	1.26403	1.4985
22.	79.2611	973.9	.21995	120.9019	.00835	128.50	206.38	.00072	1.25949	1.3068
24.	77.9014	973.5	.21233	110.5663	.00896	133.13	180.49	.00071	1.25469	1.1820
26.	76.4708	973.1	.20524	101.2749	.00952	135.71	160.74	.00069	1.24966	1.0973
28.	74.9787	966.1	.19857	91.8614	.01018	136.77	145.23	.00067	1.24442	1.0441
30.	73.4181	955.6	.19211	82.8341	.01088	136.73	132.63	.00064	1.23896	1.0086
32.	71.7871	945.1	.18573	74.6316	.01158	134.86	122.13	.00062	1.23327	.9913
34.	70.0911	932.0	.17949	66.9106	.01233	132.54	113.22	.00059	1.22737	.9814
36.	68.3319	917.5	.17326	59.7700	.01310	129.91	105.51	.00057	1.22127	.9764
38.	66.5137	902.2	.16720	53.2841	.01390	127.04	98.74	.00055	1.21498	.9746
40.	64.6423	887.2	.16160	47.5645	.01467	124.03	92.74	.00053	1.20854	.9733
42.	62.7209	871.6	.15616	42.3578	.01548	120.90	87.37	.00051	1.20194	.9753
44.	60.7592	858.7	.15069	37.8726	.01623	117.76	82.55	.00050	1.19524	.9768
46.	58.7757	848.5	.14460	33.8999	.01695	114.68	78.23	.00049	1.18848	.9810
48.	56.7800	840.3	.13906	30.5576	.01755	111.70	74.36	.00048	1.18171	.9815
50.	54.7915	833.2	.13388	27.6595	.01807	108.87	70.92	.00048	1.17499	.9810
55.	49.9376	824.7	.12262	22.1993	.01890	102.96	63.98	.00048	1.15869	.9687
60.	45.4210	830.3	.11404	18.7574	.01889	98.35	59.10	.00050	1.14366	.9425
65.	41.3837	849.9	.10709	16.5938	.01824	95.36	55.84	.00054	1.13034	.9079
70.	37.8715	882.6	.10126	15.2709	.01716	93.14	53.80	.00058	1.11884	.8750
75.	34.8651	925.7	.09625	14.4540	.01592	90.99	52.64	.00064	1.10906	.8527
80.	32.2922	976.4	.09185	13.9125	.01472	90.13	52.09	.00070	1.10073	.8307
90.	28.1693	1093.1	.08432	13.2204	.01270	92.43	52.13	.00085	1.08749	.7831
100.	25.0189	1227.1	.07808	12.8488	.01109	95.20	53.02	.00101	1.07744	.7577
110.	22.5441	1382.9	.07199	12.6343	.00980	99.07	54.02	.00117	1.06960	.7393
120.	20.5468	1540.6	.06755	12.4907	.00878	102.47	55.19	.00133	1.06330	.7289
140.	17.5143	1873.5	.06068	12.3070	.00727	110.83	58.48	.00167	1.05378	.7190
160.	15.3129	2217.3	.05583	12.1865	.00622	120.54	62.34	.00206	1.04691	.7131
180.	13.6673	2559.1	.05211	12.0608	.00545	130.87	66.42	.00247	1.04179	.7078
200.	12.3313	2904.1	.04963	11.9885	.00486	141.35	70.57	.00292	1.03765	.7048
220.	11.2432	3246.4	.04775	11.9256	.00439	151.72	74.72	.00341	1.03429	.7024
240.	10.3380	3583.1	.04634	11.8702	.00401	161.84	78.84	.00392	1.03150	.7003
260.	9.5721	3914.0	.04527	11.8208	.00369	171.64	82.91	.00446	1.02914	.6986
280.	8.9148	4238.8	.04445	11.7764	.00343	181.13	86.93	.00504	1.02712	.6970
300.	8.3359	4567.6	.04381	11.7573	.00319	190.29	90.88	.00565	1.02534	.6951
350.	7.1937	5340.3	.04279	11.6655	.00273	212.00	100.50	.00727	1.02184	.6918
400.	6.3305	6092.5	.04221	11.5923	.00240	232.31	109.76	.00905	1.01920	.6896
450.	5.6542	6833.1	.04185	11.5329	.00213	251.60	118.70	.01098	1.01714	.6880
500.	5.1095	7573.0	.04155	11.4838	.00193	270.18	127.35	.01306	1.01548	.6873
550.	4.6610	8310.8	.04132	11.4427	.00175	288.26	135.74	.01527	1.01411	.6866
600.	4.2853	9052.1	.04109	11.4078	.00161	306.00	143.90	.01762	1.01297	.6860
650.	3.9658	9797.3	.04088	11.3779	.00149	323.52	151.86	.02011	1.01200	.6855
700.	3.6908	10551.7	.04065	11.3520	.00139	340.90	159.63	.02273	1.01116	.6851
750.	3.4516	11314.6	.04041	11.3293	.00130	358.23	167.23	.02548	1.01044	.6846
800.	3.2415	12088.8	.04014	11.3093	.00122	375.53	174.68	.02835	1.00980	.6843
850.	3.0556	12876.1	.03985	11.2916	.00115	392.86	181.99	.03134	1.00924	.6841
900.	2.8899	13677.6	.03954	11.2758	.00108	410.25	189.17	.03445	1.00873	.6840
950.	2.7413	14494.5	.03920	11.2615	.00103	427.71	196.24	.03767	1.00828	.6841
1000.	2.6072	15327.2	.03885	11.2487	.00098	445.26	203.19	.04101	1.00788	.6842
1100.	2.3749	17029.5	.03813	11.2264	.00089	475.56	216.80	.04752	1.00717	.6917
1200.	2.1806	18790.7	.03739	11.2077	.00082	511.00	230.06	.05489	1.00659	.6919
1300.	2.0158	20609.8	.03664	11.1919	.00076	546.89	243.00	.06268	1.00609	.6923
1400.	1.8741	22484.1	.03590	11.1782	.00070	583.18	255.65	.07089	1.00566	.6927
1500.	1.7510	24409.1	.03518	11.1664	.00066	619.80	268.04	.07950	1.00529	.6931
1600.	1.6431	26364.5	.03452	11.1560	.00062	656.34	280.18	.08852	1.00496	.6935
1700.	1.5478	28360.1	.03389	11.1468	.00058	693.14	292.09	.09795	1.00467	.6936
1800.	1.4628	30399.3	.03328	11.1386	.00055	730.45	303.78	.10780	1.00441	.6935
2000.	1.3181	34652.9	.03210	11.1240	.00049	808.67	326.52	.12893	1.00398	.6917
2200.	1.1993	39327.3	.03078	11.1105	.00045	898.82	344.90	.15247	1.00362	.6790
2400.	1.0998	44741.6	.02918	11.0955	.00041	1013.50	366.26	.17954	1.00332	.6678
2600.	1.0148	51397.9	.02717	11.0755	.00038	1171.72	387.22	.21175	1.00306	.6487
2800.	.9410	59948.3	.02476	11.0455	.00036	1397.91	407.94	.25088	1.00284	.6221
3000.	.8755	71138.7	.02206	10.9993	.00033	1719.99	428.64	.29828	1.00264	.5909

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

12.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 17.346	.01210	1.8521	1.038	227.1	372.2	14.336	5.15	6.63	1544.
18.	.01215	1.8168	1.037	230.8	376.6	14.585	5.25	6.83	1537.
19.	.01224	1.7629	1.035	236.8	383.6	14.962	5.41	7.13	1525.
20.	.01233	1.7091	1.031	243.0	390.9	15.336	5.54	7.43	1514.
22.	.01252	1.5973	1.021	256.1	406.3	16.072	5.79	8.04	1489.
24.	.01272	1.4862	1.003	270.2	422.9	16.797	5.98	8.51	1463.
26.	.01295	1.3900	.9786	285.3	440.7	17.505	6.14	9.15	1439.
28.	.01320	1.2977	.9507	301.2	459.5	18.202	6.28	9.68	1414.
30.	.01346	1.2023	.9191	317.9	479.4	18.888	6.40	10.22	1386.
32.	.01375	1.1136	.8840	335.3	500.4	19.564	6.49	10.74	1357.
34.	.01406	1.0288	.8465	353.6	522.4	20.231	6.57	11.25	1328.
36.	.01440	.9495	.8069	372.5	545.4	20.889	6.63	11.75	1297.
38.	.01477	.8776	.7660	392.1	569.3	21.537	6.68	12.22	1267.
40.	.01517	.8101	.7249	412.2	594.2	22.175	6.70	12.67	1238.
42.	.01559	.7470	.6841	432.9	620.0	22.803	6.72	13.12	1208.
44.	.01606	.6919	.6441	454.0	646.7	23.423	6.74	13.54	1179.
46.	.01655	.6457	.6052	475.0	673.6	24.022	6.79	13.94	1151.
48.	.01708	.6042	.5677	496.8	701.8	24.622	6.82	14.29	1125.
50.	.01765	.5690	.5319	518.9	730.7	25.212	6.84	14.59	1101.
55.	.01921	.5016	.4517	574.6	805.2	26.631	6.88	15.14	1050.
60.	.02096	.4623	.3851	630.2	881.7	27.964	6.87	15.33	1016.
65.	.02285	.4435	.3313	684.0	958.3	29.188	6.86	15.26	993.
70.	.02485	.4390	.2881	735.9	1034.0	30.312	6.86	15.03	981.
75.	.02689	.4458	.2537	785.7	1108.4	31.338	6.89	14.71	976.
80.	.02895	.4593	.2260	833.8	1181.2	32.277	6.93	14.39	976.
90.	.03307	.4942	.1853	925.8	1322.5	33.944	7.09	13.93	985.
100.	.03714	.5351	.1571	1014.7	1460.4	35.396	7.31	13.68	1000.
110.	.04115	.5801	.1365	1104.2	1598.1	36.706	7.65	13.64	1017.
120.	.04511	.6260	.1208	1192.8	1734.1	37.891	7.92	13.61	1037.
140.	.05285	.7197	.0984	1372.5	2006.7	39.992	8.44	13.70	1081.
160.	.06040	.8125	.0832	1557.0	2281.8	41.827	8.88	13.85	1126.
180.	.06761	.8980	.0723	1746.4	2557.7	43.453	9.24	14.03	1167.
200.	.07490	.9879	.0638	1940.3	2839.0	44.935	9.53	14.16	1211.
220.	.08211	1.0765	.0573	2138.1	3123.4	46.290	9.77	14.30	1255.
240.	.08926	1.1642	.0521	2339.2	3410.3	47.539	9.95	14.40	1298.
260.	.09637	1.2510	.0477	2542.7	3699.2	48.696	10.09	14.49	1340.
280.	.10344	1.3372	.0441	2748.1	3989.4	49.771	10.19	14.54	1382.
300.	.11061	1.4275	.0409	2956.5	4283.8	50.782	10.27	14.57	1424.
350.	.12809	1.6388	.0348	3476.5	5013.5	53.033	10.36	14.61	1520.
400.	.14547	1.8484	.0303	3998.2	5743.9	54.983	10.40	14.60	1611.
450.	.16280	2.0569	.0269	4520.3	6473.9	56.703	10.41	14.59	1698.
500.	.18009	2.2648	.0241	5042.2	7203.4	58.239	10.42	14.59	1781.
550.	.19736	2.4722	.0219	5564.2	7932.5	59.629	10.43	14.58	1860.
600.	.21461	2.6793	.0201	6086.7	8662.0	60.896	10.44	14.59	1935.
650.	.23184	2.8862	.0185	6609.8	9391.8	62.061	10.46	14.61	2007.
700.	.24906	3.0929	.0172	7134.2	10122.9	63.151	10.49	14.63	2077.
750.	.26628	3.2995	.0160	7660.3	10855.7	64.163	10.53	14.67	2144.
800.	.28349	3.5060	.0150	8188.4	11590.3	65.112	10.58	14.71	2208.
850.	.30070	3.7124	.0141	8719.2	12327.6	66.005	10.64	14.77	2270.
900.	.31790	3.9188	.0133	9253.0	13067.8	66.850	10.70	14.84	2330.
950.	.33510	4.1252	.0126	9790.2	13811.4	67.653	10.78	14.91	2389.
1000.	.35230	4.3315	.0120	10331.0	14558.6	68.419	10.87	14.99	2445.
1100.	.38669	4.7441	.0109	11427.1	16067.4	69.846	11.05	15.17	2553.
1200.	.42107	5.1566	.0100	12542.5	17595.4	71.168	11.24	15.37	2655.
1300.	.45546	5.5691	.0092	13678.5	19143.9	72.407	11.45	15.58	2752.
1400.	.48983	5.9815	.0086	14835.8	20713.8	73.578	11.68	15.80	2845.
1500.	.52421	6.3939	.0080	16014.9	22305.4	74.690	11.90	16.03	2934.
1600.	.55859	6.8063	.0075	17214.8	23917.8	75.723	12.12	16.24	3020.
1700.	.59296	7.2187	.0071	18436.3	25551.9	76.709	12.33	16.46	3104.
1800.	.62734	7.6311	.0067	19679.7	27207.8	77.655	12.55	16.67	3184.
2000.	.69613	8.4559	.0060	22234.2	30587.7	79.446	12.99	17.12	3338.
2200.	.76502	9.2807	.0055	24880.8	34061.0	81.093	13.53	17.68	3482.
2400.	.83417	10.1055	.0050	27653.4	37663.5	82.655	14.25	18.44	3616.
2600.	.90390	10.9302	.0046	30605.8	41452.7	84.171	15.27	19.56	3740.
2800.	.97471	11.7550	.0043	33819.7	45516.2	85.681	16.74	21.18	3856.
3000.	1.04737	12.5798	.0040	37405.3	49973.8	87.227	18.78	23.48	3965.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

12.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(\partial H/\partial V)_P$	$V(\partial P/\partial U)_V$	$-V(\partial P/\partial V)_T$	$(\partial V/\partial T)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 17.346	82.6756	977.1	.24393	153.1232	.00678	111.40	329.05	.00073	1.27159	1.9568
18.	82.3055	984.2	.23990	149.5335	.00694	114.80	306.11	.00074	1.27027	1.8209
19.	81.7264	993.1	.23428	144.0750	.00718	118.84	276.63	.00073	1.26822	1.6608
20.	81.1312	999.7	.22926	138.6583	.00744	122.68	252.39	.00073	1.26611	1.5293
22.	79.9020	1004.2	.22092	127.6311	.00800	130.36	215.25	.00073	1.26175	1.3267
24.	78.5874	1002.8	.21339	116.7973	.00859	135.25	187.90	.00072	1.25711	1.1967
26.	77.2094	1003.1	.20637	107.3243	.00912	138.06	167.16	.00070	1.25225	1.1075
28.	75.7724	1001.0	.19973	98.3287	.00967	139.32	150.91	.00068	1.24720	1.0483
30.	74.2761	992.6	.19348	89.3044	.01029	139.49	137.80	.00066	1.24196	1.0092
32.	72.7171	983.7	.18727	80.9801	.01092	137.79	126.94	.00064	1.23651	.9893
34.	71.1002	972.4	.18126	73.1453	.01157	135.63	117.75	.00061	1.23088	.9770
36.	69.4279	960.1	.17529	65.9188	.01224	133.16	109.84	.00059	1.22507	.9694
38.	67.7045	947.8	.16945	59.4184	.01289	130.45	102.93	.00057	1.21910	.9642
40.	65.9366	933.5	.16407	53.4161	.01357	127.60	96.83	.00055	1.21299	.9614
42.	64.1275	918.5	.15878	47.9026	.01428	124.62	91.39	.00053	1.20677	.9620
44.	62.2808	905.8	.15351	43.0902	.01495	121.62	86.50	.00052	1.20044	.9630
46.	60.4123	898.3	.14761	39.0098	.01551	118.66	82.11	.00051	1.19405	.9643
48.	58.5352	890.3	.14225	35.3675	.01605	115.79	78.17	.00050	1.18766	.9648
50.	56.6572	884.2	.13721	32.2400	.01650	113.03	74.64	.00049	1.18129	.9633
55.	52.0541	874.9	.12613	26.1093	.01730	106.96	67.44	.00049	1.16577	.9544
60.	47.7096	877.8	.11751	22.0559	.01746	102.33	62.21	.00050	1.15126	.9319
65.	43.7550	894.0	.11037	19.4053	.01707	99.22	58.59	.00053	1.13815	.9012
70.	40.2475	922.1	.10430	17.6700	.01631	96.81	56.20	.00058	1.12661	.8729
75.	37.1910	961.7	.09903	16.5807	.01530	94.49	54.74	.00062	1.11662	.8522
80.	34.5429	1010.0	.09439	15.8651	.01425	93.37	53.93	.00068	1.10801	.8312
90.	30.2433	1123.4	.08640	14.9467	.01240	95.29	53.61	.00081	1.09414	.7835
100.	26.9263	1254.0	.07982	14.4084	.01091	97.77	54.26	.00096	1.08352	.7591
110.	24.2990	1407.9	.07343	14.0951	.00969	101.69	55.28	.00110	1.07516	.7412
120.	22.1672	1564.0	.06878	13.8769	.00870	104.73	56.24	.00125	1.06841	.7309
140.	18.9214	1896.2	.06161	13.6180	.00722	112.59	59.24	.00156	1.05819	.7208
160.	16.5567	2240.4	.05656	13.4531	.00618	121.91	62.93	.00191	1.05079	.7149
180.	14.7907	2578.2	.05287	13.2823	.00544	131.96	66.89	.00229	1.04528	.7112
200.	13.3517	2926.7	.05012	13.1900	.00484	142.23	70.96	.00271	1.04081	.7062
220.	12.1790	3269.7	.04818	13.1110	.00437	152.44	75.05	.00315	1.03718	.7038
240.	11.2029	3607.1	.04673	13.0422	.00399	162.44	79.12	.00362	1.03417	.7016
260.	10.3766	3938.7	.04562	12.9814	.00368	172.15	83.16	.00412	1.03162	.6997
280.	9.6672	4264.0	.04477	12.9272	.00341	181.56	87.14	.00465	1.02943	.6980
300.	9.0407	4595.0	.04410	12.9053	.00317	190.67	91.07	.00521	1.02751	.6961
350.	7.8071	5368.6	.04303	12.7940	.00272	212.27	100.65	.00670	1.02372	.6925
400.	6.8741	6121.3	.04242	12.7058	.00239	232.52	109.88	.00834	1.02087	.6901
450.	6.1424	6862.3	.04203	12.6343	.00213	251.78	118.80	.01011	1.01863	.6884
500.	5.5527	7602.5	.04171	12.5755	.00192	270.33	127.43	.01202	1.01683	.6876
550.	5.0669	8340.5	.04146	12.5264	.00175	288.38	135.81	.01405	1.01535	.6868
600.	4.6597	9081.9	.04123	12.4847	.00161	306.11	143.97	.01621	1.01411	.6863
650.	4.3133	9827.2	.04100	12.4490	.00149	323.61	151.91	.01849	1.01306	.6856
700.	4.0150	10581.8	.04076	12.4180	.00138	340.99	159.68	.02089	1.01215	.6852
750.	3.7554	11344.8	.04051	12.3910	.00129	358.30	167.28	.02342	1.01136	.6848
800.	3.5275	12119.2	.04023	12.3672	.00121	375.60	174.72	.02605	1.01067	.6844
850.	3.3256	12906.6	.03994	12.3461	.00114	392.93	182.03	.02880	1.01006	.6842
900.	3.1456	13708.4	.03962	12.3272	.00108	410.31	189.21	.03165	1.00951	.6841
950.	2.9842	14525.4	.03928	12.3103	.00103	427.76	196.27	.03461	1.00902	.6841
1000.	2.8385	15358.3	.03892	12.2950	.00098	445.31	203.22	.03767	1.00858	.6843
1100.	2.5861	17061.0	.03820	12.2685	.00089	475.56	216.83	.04363	1.00781	.6918
1200.	2.3749	18822.6	.03745	12.2463	.00082	511.00	230.08	.05040	1.00717	.6920
1300.	2.1956	20642.2	.03669	12.2275	.00075	546.89	243.02	.05755	1.00663	.6924
1400.	2.0415	22516.8	.03595	12.2113	.00070	583.17	255.67	.06508	1.00616	.6928
1500.	1.9076	24442.2	.03522	12.1972	.00066	619.80	268.06	.07297	1.00576	.6932
1600.	1.7902	26397.8	.03456	12.1849	.00062	656.32	280.20	.08125	1.00540	.6935
1700.	1.6864	28393.2	.03393	12.1740	.00058	693.10	292.10	.08989	1.00509	.6937
1800.	1.5940	30431.4	.03332	12.1642	.00055	730.36	303.79	.09892	1.00481	.6936
2000.	1.4365	34678.1	.03214	12.1471	.00049	808.28	326.54	.11828	1.00433	.6918
2200.	1.3072	39331.6	.03083	12.1313	.00045	897.60	344.89	.13982	1.00394	.6793
2400.	1.1988	44696.1	.02926	12.1143	.00041	1010.35	366.26	.16451	1.00362	.6686
2600.	1.1063	51252.1	.02731	12.0923	.00038	1164.75	387.21	.19380	1.00334	.6502
2800.	1.0259	59624.5	.02495	12.0599	.00036	1384.20	407.91	.22929	1.00309	.6243
3000.	.9548	70529.5	.02231	12.0108	.00033	1695.49	428.57	.27223	1.00288	.5936

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

13.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 17.609	.01204	1.9023	1.045	228.1	384.6	14.355	5.18	6.65	1562.
18.	.01207	1.8816	1.045	230.3	387.2	14.502	5.24	6.77	1558.
19.	.01215	1.8287	1.043	236.2	394.1	14.876	5.40	7.07	1547.
20.	.01224	1.7758	1.040	242.2	401.4	15.246	5.53	7.36	1537.
22.	.01242	1.6654	1.032	255.1	416.6	15.975	5.78	7.94	1513.
24.	.01262	1.5602	1.016	269.0	433.1	16.690	5.98	8.50	1490.
26.	.01283	1.4594	.9926	283.7	450.6	17.390	6.14	9.03	1465.
28.	.01307	1.3665	.9651	299.3	469.2	18.078	6.28	9.54	1441.
30.	.01332	1.2748	.9355	315.6	488.8	18.754	6.40	10.05	1415.
32.	.01359	1.1857	.9023	332.7	509.4	19.419	6.50	10.56	1388.
34.	.01388	1.1016	.8665	350.5	531.0	20.074	6.58	11.04	1360.
36.	.01420	1.0225	.8287	369.0	553.6	20.719	6.64	11.52	1331.
38.	.01454	.9503	.7896	388.1	577.1	21.354	6.69	11.96	1303.
40.	.01490	.8823	.7499	407.7	601.4	21.978	6.72	12.38	1275.
42.	.01529	.8203	.7103	427.8	626.6	22.592	6.74	12.78	1247.
44.	.01571	.7631	.6715	448.3	652.5	23.195	6.76	13.18	1219.
46.	.01616	.7129	.6335	468.7	678.7	23.777	6.81	13.57	1192.
48.	.01664	.6703	.5968	489.9	706.2	24.362	6.84	13.90	1167.
50.	.01715	.6317	.5616	511.4	734.3	24.936	6.87	14.21	1143.
55.	.01854	.5595	.4816	565.8	806.8	26.318	6.91	14.74	1093.
60.	.02010	.5133	.4142	620.3	881.5	27.619	6.90	14.99	1056.
65.	.02178	.4881	.3586	673.4	956.6	28.819	6.89	15.01	1031.
70.	.02357	.4787	.3134	725.0	1031.4	29.928	6.89	14.87	1016.
75.	.02541	.4804	.2767	774.8	1105.2	30.947	6.92	14.64	1008.
80.	.02728	.4897	.2470	823.1	1177.8	31.884	6.96	14.38	1006.
90.	.03104	.5203	.2027	915.7	1319.2	33.551	7.11	13.96	1010.
100.	.03478	.5586	.1718	1005.4	1457.5	35.008	7.33	13.72	1023.
110.	.03847	.6009	.1492	1095.6	1595.8	36.324	7.67	13.70	1036.
120.	.04212	.6457	.1319	1184.8	1732.4	37.514	7.94	13.68	1055.
140.	.04928	.7379	.1073	1365.7	2006.3	39.625	8.46	13.76	1096.
160.	.05626	.8298	.0906	1551.3	2282.6	41.468	8.90	13.91	1139.
180.	.06311	.9203	.0785	1741.6	2562.0	43.114	9.25	14.06	1182.
200.	.06966	1.0039	.0694	1936.0	2841.6	44.587	9.55	14.20	1222.
220.	.07633	1.0926	.0623	2134.3	3126.6	45.945	9.78	14.33	1265.
240.	.08295	1.1803	.0566	2335.8	3414.1	47.196	9.96	14.43	1308.
260.	.08952	1.2673	.0518	2539.7	3703.4	48.355	10.09	14.51	1350.
280.	.09606	1.3536	.0478	2745.4	3994.1	49.432	10.20	14.56	1391.
300.	.10270	1.4447	.0444	2954.1	4289.2	50.445	10.27	14.59	1432.
350.	.11885	1.6560	.0377	3474.7	5019.7	52.698	10.37	14.62	1528.
400.	.13491	1.8656	.0329	3996.8	5750.6	54.650	10.40	14.61	1619.
450.	.15091	2.0742	.0291	4519.2	6481.0	56.370	10.41	14.60	1705.
500.	.16687	2.2820	.0261	5041.3	7210.7	57.907	10.42	14.59	1788.
550.	.18281	2.4894	.0237	5563.5	7940.0	59.298	10.43	14.59	1866.
600.	.19874	2.6965	.0217	6086.1	8669.7	60.564	10.44	14.59	1941.
650.	.21465	2.9033	.0200	6609.3	9399.7	61.730	10.46	14.61	2013.
700.	.23055	3.1100	.0186	7133.8	10130.9	62.820	10.49	14.63	2083.
750.	.24644	3.3166	.0174	7660.0	10863.8	63.833	10.53	14.67	2149.
800.	.26233	3.5231	.0163	8188.2	11598.5	64.781	10.58	14.71	2213.
850.	.27821	3.7295	.0153	8719.0	12335.8	65.675	10.64	14.77	2276.
900.	.29409	3.9359	.0145	9252.9	13076.1	66.520	10.71	14.84	2335.
950.	.30997	4.1422	.0137	9790.0	13819.7	67.323	10.78	14.91	2393.
1000.	.32585	4.3485	.0130	10330.9	14567.0	68.089	10.87	14.99	2450.
1100.	.35759	4.7610	.0118	11427.1	16075.8	69.516	11.05	15.17	2557.
1200.	.38933	5.1735	.0108	12542.5	17603.9	70.838	11.24	15.37	2659.
1300.	.42107	5.5859	.0100	13678.5	19152.4	72.077	11.46	15.58	2756.
1400.	.45281	5.9983	.0093	14835.9	20722.4	73.247	11.68	15.80	2849.
1500.	.48454	6.4107	.0087	16015.0	22314.0	74.359	11.90	16.03	2938.
1600.	.51627	6.8231	.0081	17214.9	23926.4	75.393	12.12	16.24	3024.
1700.	.54800	7.2355	.0076	18436.4	25560.4	76.379	12.33	16.46	3107.
1800.	.57974	7.6478	.0072	19679.8	27216.3	77.325	12.55	16.67	3188.
2000.	.64323	8.4726	.0065	22233.8	30595.7	79.115	12.99	17.12	3342.
2200.	.70681	9.2973	.0059	24878.8	34067.4	80.762	13.52	17.67	3486.
2400.	.77063	10.1220	.0054	27647.4	37665.7	82.322	14.22	18.41	3620.
2600.	.83496	10.9468	.0050	30591.1	41445.6	83.834	15.22	19.49	3744.
2800.	.90026	11.7715	.0046	33788.0	45491.4	85.338	16.64	21.07	3860.
3000.	.96719	12.5963	.0043	37344.2	49917.6	86.873	18.60	23.28	3969.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

13.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 17.609	83.0623	1005.0	.24284	158.0101	.00662	114.01	335.11	.00074	1.27296	1.9542
18.	82.8462	1009.4	.24051	155.8840	.00670	116.02	320.89	.00075	1.27219	1.8717
19.	82.2833	1019.2	.23496	150.4680	.00693	120.21	289.44	.00074	1.27019	1.7017
20.	81.7051	1026.7	.23000	145.0889	.00717	124.20	263.66	.00074	1.25814	1.5624
22.	80.5139	1032.6	.22184	134.0900	.00769	132.17	224.29	.00074	1.26392	1.3483
24.	79.2437	1035.2	.21445	123.6395	.00821	137.30	195.46	.00073	1.25943	1.2105
26.	77.9135	1034.6	.20748	113.7033	.00873	140.33	173.66	.00072	1.25473	1.1177
28.	76.5237	1033.9	.20074	104.5734	.00923	141.78	156.62	.00070	1.24984	1.0541
30.	75.0835	1028.6	.19469	95.7169	.00977	142.12	142.96	.00068	1.24479	1.0113
32.	73.5879	1020.8	.18866	87.2503	.01034	140.58	131.70	.00065	1.23955	.9890
34.	72.0396	1011.5	.18281	79.3570	.01092	138.57	122.22	.00063	1.23415	.9741
36.	70.4416	1001.0	.17706	72.0274	.01151	136.24	114.09	.00060	1.22859	.9645
38.	68.7994	990.4	.17146	65.3802	.01208	133.67	107.01	.00058	1.22289	.9575
40.	67.1188	977.6	.16626	59.2195	.01266	130.95	100.79	.00057	1.21707	.9528
42.	65.4024	965.2	.16115	53.6493	.01324	128.10	95.26	.00055	1.21115	.9503
44.	63.6578	953.2	.15602	48.5764	.01382	125.23	90.30	.00054	1.20516	.9501
46.	61.8871	945.3	.15028	44.1193	.01436	122.37	85.83	.00052	1.19909	.9521
48.	60.1057	938.7	.14506	40.2913	.01481	119.58	81.81	.00052	1.19301	.9512
50.	58.3246	932.2	.14015	36.8430	.01524	116.90	78.20	.00051	1.18695	.9505
55.	53.9404	924.0	.12926	30.1816	.01596	110.78	70.76	.00050	1.17212	.9419
60.	49.7621	924.8	.12067	25.5448	.01621	106.06	65.25	.00051	1.15810	.9225
65.	45.9036	938.2	.11341	22.4063	.01600	102.87	61.30	.00054	1.14526	.8948
70.	42.4298	963.8	.10715	20.3128	.01543	100.30	58.60	.00057	1.13378	.8687
75.	39.3526	999.8	.10167	18.9033	.01464	97.88	56.85	.00061	1.12368	.8500
80.	36.6529	1044.8	.09681	17.9483	.01376	96.52	55.79	.00066	1.11487	.8310
90.	32.2181	1154.6	.08842	16.7631	.01209	98.12	55.10	.00079	1.10050	.7839
100.	28.7547	1282.8	.08151	16.0613	.01070	100.31	55.51	.00092	1.08936	.7595
110.	25.9920	1434.1	.07486	15.6181	.00955	104.29	56.55	.00105	1.08054	.7429
120.	23.7405	1589.3	.07000	15.3300	.00861	107.01	57.32	.00119	1.07339	.7326
140.	20.2926	1920.5	.06252	14.9742	.00716	114.37	60.04	.00147	1.06250	.7223
160.	17.7749	2264.3	.05727	14.7495	.00614	123.32	63.54	.00180	1.05460	.7166
180.	15.8461	2612.0	.05350	14.5839	.00538	133.08	67.38	.00215	1.04857	.7118
200.	14.3558	2948.8	.05065	14.4112	.00482	143.14	71.36	.00253	1.04393	.7081
220.	13.1011	3293.4	.04861	14.3141	.00435	153.19	75.39	.00294	1.04004	.7052
240.	12.0560	3631.4	.04711	14.2302	.00397	163.06	79.42	.00337	1.03680	.7029
260.	11.1708	3963.6	.04596	14.1567	.00366	172.68	83.41	.00384	1.03407	.7009
280.	10.4105	4289.5	.04508	14.0916	.00340	182.01	87.37	.00432	1.03172	.6991
300.	9.7370	4622.7	.04439	14.0668	.00316	191.06	91.27	.00484	1.02965	.6970
350.	8.4142	5397.0	.04327	13.9340	.00271	212.56	100.81	.00622	1.02558	.6932
400.	7.4126	6150.3	.04262	13.8292	.00238	232.74	110.01	.00774	1.02251	.6907
450.	6.6266	6891.6	.04220	13.7446	.00212	251.95	118.90	.00938	1.02011	.6889
500.	5.9926	7632.0	.04187	13.6751	.00191	270.47	127.52	.01114	1.01817	.6879
550.	5.4700	8370.2	.04160	13.6171	.00174	288.51	135.89	.01302	1.01658	.6871
600.	5.0318	9111.8	.04135	13.5680	.00160	306.22	144.03	.01501	1.01524	.6865
650.	4.6588	9857.2	.04112	13.5260	.00148	323.71	151.97	.01712	1.01411	.6858
700.	4.3375	10611.9	.04087	13.4896	.00138	341.07	159.73	.01934	1.01313	.6854
750.	4.0577	11375.1	.04061	13.4579	.00129	358.38	167.32	.02167	1.01228	.6849
800.	3.8120	12149.6	.04033	13.4299	.00121	375.67	174.76	.02411	1.01153	.6845
850.	3.5944	12937.1	.04003	13.4051	.00114	392.99	182.07	.02665	1.01087	.6843
900.	3.4003	13739.0	.03970	13.3829	.00108	410.37	189.24	.02928	1.01028	.6842
950.	3.2261	14556.2	.03936	13.3631	.00102	427.82	196.30	.03202	1.00975	.6842
1000.	3.0689	15389.3	.03899	13.3451	.00097	445.36	203.25	.03484	1.00928	.6843
1100.	2.7965	17092.4	.03826	13.3140	.00089	475.56	216.86	.04035	1.00845	.6919
1200.	2.5685	18854.4	.03751	13.2880	.00082	511.00	230.11	.04660	1.00776	.6921
1300.	2.3749	20674.4	.03675	13.2659	.00075	546.89	243.04	.05320	1.00717	.6925
1400.	2.2085	22549.5	.03600	13.2470	.00070	583.17	255.69	.06016	1.00667	.6929
1500.	2.0638	24475.3	.03527	13.2305	.00065	619.79	268.07	.06745	1.00623	.6933
1600.	1.9370	26431.0	.03460	13.2161	.00061	656.31	280.21	.07509	1.00585	.6936
1700.	1.8248	28426.3	.03396	13.2033	.00058	693.06	292.12	.08307	1.00551	.6937
1800.	1.7249	30463.7	.03336	13.1919	.00055	730.27	303.81	.09141	1.00521	.6936
2000.	1.5547	34704.5	.03218	13.1719	.00049	807.93	326.55	.10928	1.00469	.6920
2200.	1.4148	39339.6	.03089	13.1538	.00045	896.52	344.89	.12912	1.00427	.6797
2400.	1.2976	44660.2	.02934	13.1347	.00041	1007.58	366.25	.15182	1.00392	.6693
2600.	1.1977	51127.8	.02743	13.1105	.00038	1158.60	387.20	.17866	1.00361	.6514
2800.	1.1108	59343.2	.02512	13.0757	.00035	1372.09	407.88	.21110	1.00335	.6262
3000.	1.0339	69996.3	.02253	13.0236	.00033	1673.86	428.52	.25031	1.00312	.5961

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

14.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 17.869	.01198	1.9517	1.052	229.2	396.9	14.374	5.21	6.67	1580.
18.	.01199	1.9449	1.052	229.9	397.8	14.423	5.24	6.71	1579.
19.	.01207	1.8929	1.051	235.6	404.7	14.793	5.39	7.00	1569.
20.	.01216	1.8408	1.049	241.6	411.8	15.160	5.53	7.29	1559.
22.	.01233	1.7372	1.039	254.3	427.0	15.883	5.77	7.85	1537.
24.	.01252	1.6297	1.027	267.9	443.2	16.589	5.97	8.41	1515.
26.	.01273	1.5244	1.006	282.4	460.5	17.281	6.14	8.93	1489.
28.	.01295	1.4333	.9796	297.6	478.9	17.960	6.28	9.43	1466.
30.	.01318	1.3439	.9509	313.7	498.2	18.627	6.40	9.91	1442.
32.	.01344	1.2548	.9194	330.4	518.5	19.283	6.51	10.40	1416.
34.	.01371	1.1721	.8851	347.8	539.8	19.927	6.59	10.86	1390.
36.	.01401	1.0925	.8490	365.9	562.0	20.561	6.66	11.32	1363.
38.	.01432	1.0212	.8114	384.5	585.1	21.185	6.71	11.74	1336.
40.	.01466	.9529	.7731	403.7	608.9	21.797	6.74	12.13	1310.
42.	.01502	.8909	.7347	423.3	633.6	22.398	6.76	12.50	1284.
44.	.01541	.8333	.6969	443.3	658.9	22.988	6.78	12.87	1257.
46.	.01582	.7799	.6598	463.1	684.5	23.556	6.84	13.26	1230.
48.	.01625	.7351	.6238	483.8	711.4	24.127	6.87	13.58	1205.
50.	.01671	.6957	.5891	504.8	738.8	24.688	6.90	13.86	1183.
55.	.01797	.6179	.5096	558.0	809.6	26.037	6.94	14.40	1133.
60.	.01937	.5657	.4416	611.5	882.7	27.310	6.92	14.69	1095.
65.	.02089	.5344	.3847	663.9	956.4	28.489	6.92	14.77	1068.
70.	.02250	.5198	.3378	715.1	1030.2	29.582	6.92	14.70	1051.
75.	.02418	.5164	.2992	764.8	1103.3	30.592	6.94	14.54	1040.
80.	.02589	.5221	.2676	813.2	1175.6	31.524	6.99	14.34	1035.
90.	.02933	.5479	.2199	906.3	1317.0	33.192	7.14	13.97	1036.
100.	.03278	.5833	.1865	996.6	1455.5	34.651	7.35	13.76	1045.
110.	.03620	.6234	.1619	1087.4	1594.2	35.970	7.69	13.75	1056.
120.	.03958	.6666	.1431	1177.2	1731.3	37.164	7.96	13.73	1073.
140.	.04623	.7567	.1163	1359.2	2006.4	39.284	8.47	13.82	1111.
160.	.05272	.8476	.0980	1545.6	2283.8	41.135	8.92	13.96	1152.
180.	.05909	.9381	.0849	1736.8	2564.1	42.786	9.28	14.10	1194.
200.	.06537	1.0274	.0749	1932.1	2847.2	44.278	9.56	14.23	1236.
220.	.07138	1.1089	.0672	2130.7	3130.0	45.625	9.79	14.36	1275.
240.	.07753	1.1967	.0610	2332.5	3418.0	46.879	9.97	14.46	1318.
260.	.08365	1.2837	.0559	2536.7	3707.8	48.039	10.10	14.53	1359.
280.	.08973	1.3701	.0516	2742.7	3998.9	49.117	10.20	14.58	1399.
300.	.09592	1.4620	.0479	2951.8	4294.7	50.132	10.28	14.61	1441.
350.	.11093	1.6734	.0407	3472.9	5025.9	52.388	10.37	14.63	1536.
400.	.12585	1.8830	.0354	3995.4	5757.3	54.341	10.40	14.62	1627.
450.	.14071	2.0915	.0314	4518.1	6488.1	56.062	10.41	14.60	1713.
500.	.15554	2.2993	.0282	5040.5	7218.1	57.600	10.42	14.60	1794.
550.	.17035	2.5067	.0256	5562.8	7947.6	58.991	10.43	14.59	1873.
600.	.18514	2.7137	.0234	6085.6	8677.5	60.258	10.45	14.60	1947.
650.	.19991	2.9205	.0216	6608.8	9407.6	61.423	10.47	14.61	2019.
700.	.21468	3.1271	.0200	7133.4	10138.9	62.514	10.50	14.64	2088.
750.	.22944	3.3337	.0187	7659.7	10871.8	63.526	10.53	14.67	2155.
800.	.24419	3.5401	.0175	8188.0	11606.6	64.475	10.58	14.72	2219.
850.	.25894	3.7465	.0165	8718.9	12344.0	65.369	10.64	14.77	2281.
900.	.27369	3.9528	.0156	9252.7	13084.4	66.214	10.71	14.84	2340.
950.	.28843	4.1591	.0147	9790.0	13828.0	67.017	10.78	14.91	2398.
1000.	.30317	4.3654	.0140	10330.9	14575.3	67.783	10.87	15.00	2454.
1100.	.33265	4.7779	.0127	11427.1	16084.2	69.210	11.05	15.17	2562.
1200.	.36213	5.1903	.0117	12542.6	17612.3	70.532	11.25	15.37	2663.
1300.	.39160	5.6027	.0108	13678.6	19160.9	71.771	11.46	15.58	2760.
1400.	.42106	6.0150	.0100	14836.0	20730.9	72.942	11.68	15.80	2853.
1500.	.45053	6.4274	.0093	16015.1	22322.6	74.054	11.90	16.03	2942.
1600.	.47999	6.8397	.0087	17215.0	23934.9	75.087	12.12	16.24	3028.
1700.	.50946	7.2521	.0082	18436.5	25569.0	76.074	12.33	16.46	3111.
1800.	.53893	7.6644	.0078	19679.8	27224.8	77.019	12.55	16.67	3191.
2000.	.59788	8.4891	.0070	22233.4	30603.8	78.809	12.99	17.12	3345.
2200.	.65692	9.3138	.0064	24877.1	34074.0	80.455	13.51	17.56	3489.
2400.	.71617	10.1385	.0058	27642.2	37668.6	82.013	14.20	18.38	3623.
2600.	.77588	10.9632	.0054	30578.0	41440.3	83.522	15.17	19.44	3748.
2800.	.83645	11.7880	.0050	33759.9	45470.2	85.020	16.54	20.96	3864.
3000.	.89849	12.6127	.0047	37289.7	49868.5	86.546	18.44	23.11	3973.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

14.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 17.869	83.4399	1032.3	.24187	162.8525	.00646	116.54	341.17	.00075	1.27431	1.9528
18.	83.3689	1033.9	.24110	162.1439	.00649	117.21	336.21	.00075	1.27405	1.9247
19.	82.8207	1044.6	.23561	156.7682	.00671	121.55	302.68	.00075	1.27210	1.7444
20.	82.2581	1052.9	.23071	151.4246	.00693	125.67	275.26	.00075	1.27010	1.5972
22.	81.0903	1063.9	.22214	140.8714	.00738	133.88	233.37	.00076	1.26596	1.3679
24.	79.8708	1065.2	.21544	130.1661	.00789	139.29	203.13	.00075	1.26164	1.2262
26.	78.5812	1063.8	.20856	119.7910	.00840	142.52	180.21	.00073	1.25709	1.1295
28.	77.2394	1065.2	.20185	110.7064	.00885	144.16	162.39	.00071	1.25236	1.0617
30.	75.8487	1062.5	.19578	101.9367	.00933	144.67	148.14	.00069	1.24747	1.0149
32.	74.4075	1056.1	.18992	93.3669	.00985	143.26	136.44	.00067	1.24242	.9904
34.	72.9201	1049.0	.18422	85.4730	.01036	141.38	126.64	.00064	1.23722	.9730
36.	71.3871	1039.7	.17864	77.9869	.01089	139.18	118.26	.00062	1.23187	.9617
38.	69.8145	1031.1	.17324	71.2911	.01138	136.72	111.01	.00060	1.22641	.9528
40.	68.2087	1019.8	.16823	64.9973	.01189	134.12	104.65	.00058	1.22084	.9465
42.	66.5716	1009.1	.16328	59.3071	.01239	131.38	99.00	.00057	1.21518	.9421
44.	64.9100	998.8	.15830	54.0908	.01288	128.61	93.96	.00055	1.20946	.9401
46.	63.2267	990.9	.15266	49.3116	.01338	125.85	89.42	.00054	1.20368	.9420
48.	61.5326	984.8	.14756	45.2351	.01379	123.14	85.33	.00053	1.19788	.9411
50.	59.8340	979.6	.14277	41.6279	.01415	120.51	81.64	.00052	1.19208	.9392
55.	55.6406	971.6	.13206	34.3785	.01482	114.47	73.98	.00051	1.17785	.9308
60.	51.6176	971.2	.12354	29.1990	.01512	109.56	68.21	.00052	1.16431	.9144
65.	47.8611	982.2	.11623	25.5765	.01504	106.33	63.98	.00054	1.15176	.8890
70.	44.4354	1005.4	.10983	23.0981	.01462	103.64	60.99	.00057	1.14040	.8651
75.	41.3625	1038.3	.10419	21.3608	.01401	101.15	58.97	.00061	1.13027	.8479
80.	38.6321	1080.8	.09913	20.1711	.01327	99.59	57.67	.00065	1.12132	.8303
90.	34.0900	1186.9	.09036	18.6790	.01177	100.88	56.60	.00076	1.10655	.7840
100.	30.5058	1312.8	.08315	17.7952	.01048	102.81	56.76	.00088	1.09498	.7594
110.	27.6264	1462.2	.07624	17.2212	.00940	106.87	57.83	.00101	1.08575	.7438
120.	25.2655	1616.0	.07119	16.8430	.00850	109.27	58.40	.00113	1.07823	.7338
140.	21.6318	1945.3	.06343	16.3678	.00710	116.17	60.85	.00140	1.06672	.7237
160.	18.9674	2289.0	.05798	16.0775	.00610	124.76	64.17	.00170	1.05833	.7180
180.	16.9222	2637.9	.05407	15.8753	.00535	134.24	67.89	.00202	1.05193	.7132
200.	15.2983	2985.5	.05120	15.7172	.00476	144.08	71.78	.00238	1.04686	.7087
220.	14.0096	3317.3	.04903	15.5346	.00433	153.96	75.75	.00276	1.04286	.7064
240.	12.8974	3656.0	.04748	15.4341	.00395	163.70	79.72	.00316	1.03941	.7041
260.	11.9548	3988.7	.04630	15.3466	.00364	173.22	83.68	.00359	1.03649	.7020
280.	11.1448	4315.2	.04539	15.2694	.00338	182.48	87.60	.00404	1.03399	.7002
300.	10.4251	4650.6	.04467	15.2420	.00314	191.46	91.48	.00453	1.03177	.6980
350.	9.0149	5425.6	.04351	15.0854	.00270	212.85	100.97	.00581	1.02743	.6940
400.	7.9461	6179.4	.04282	14.9625	.00237	232.97	110.14	.00722	1.02415	.6912
450.	7.1067	6921.0	.04238	14.8637	.00211	252.14	119.01	.00875	1.02158	.6893
500.	6.4291	7661.6	.04202	14.7826	.00191	270.62	127.61	.01038	1.01951	.6883
550.	5.8704	8400.0	.04174	14.7150	.00174	288.64	135.97	.01213	1.01780	.6874
600.	5.4014	9141.7	.04148	14.6579	.00160	306.33	144.10	.01399	1.01637	.6867
650.	5.0022	9887.3	.04124	14.6090	.00148	323.81	152.03	.01595	1.01515	.6860
700.	4.6581	10642.0	.04098	14.5667	.00138	341.16	159.79	.01801	1.01411	.6855
750.	4.3585	11405.3	.04071	14.5298	.00129	358.46	167.37	.02018	1.01319	.6850
800.	4.0951	12180.0	.04042	14.4973	.00121	375.74	174.81	.02245	1.01239	.6846
850.	3.8619	12967.7	.04011	14.4685	.00114	393.06	182.11	.02480	1.01168	.6844
900.	3.6538	13769.7	.03978	14.4428	.00108	410.43	189.28	.02725	1.01105	.6843
950.	3.4670	14587.1	.03943	14.4198	.00102	427.87	196.34	.02979	1.01049	.6843
1000.	3.2984	15420.3	.03906	14.3990	.00097	445.41	203.29	.03242	1.00997	.6844
1100.	3.0061	17123.8	.03833	14.3630	.00089	475.56	216.89	.03753	1.00909	.6920
1200.	2.7615	18886.2	.03756	14.3328	.00081	511.00	230.13	.04334	1.00834	.6922
1300.	2.5537	20706.6	.03680	14.3073	.00075	546.89	243.06	.04948	1.00772	.6926
1400.	2.3749	22582.1	.03604	14.2853	.00070	583.17	255.71	.05594	1.00717	.6929
1500.	2.2196	24508.2	.03531	14.2663	.00065	619.79	268.09	.06272	1.00670	.6933
1600.	2.0834	26464.2	.03464	14.2496	.00061	656.29	280.23	.06981	1.00629	.6936
1700.	1.9629	28459.3	.03400	14.2348	.00058	693.03	292.13	.07723	1.00593	.6938
1800.	1.8555	30496.1	.03340	14.2216	.00055	730.19	303.82	.08497	1.00560	.6937
2000.	1.6726	34731.7	.03222	14.1986	.00049	807.63	326.56	.10156	1.00505	.6921
2200.	1.5223	39350.5	.03094	14.1780	.00045	895.56	344.89	.11996	1.00459	.6799
2400.	1.3963	44632.1	.02942	14.1565	.00041	1005.10	366.25	.14095	1.00421	.6699
2600.	1.2889	51021.0	.02754	14.1301	.00038	1153.11	387.19	.16571	1.00389	.6526
2800.	1.1955	59096.6	.02527	14.0929	.00035	1361.30	407.86	.19557	1.00361	.6280
3000.	1.1130	69525.3	.02273	14.0377	.00033	1654.59	428.47	.23163	1.00336	.5983

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

15.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 18.125	.01193	2.0004	1.059	230.3	409.2	14.392	5.25	6.69	1598.
19.	.01200	1.9556	1.059	235.2	415.2	14.714	5.38	6.95	1589.
20.	.01208	1.9045	1.057	241.1	422.3	15.077	5.52	7.23	1580.
22.	.01225	1.8024	1.049	253.6	437.3	15.794	5.76	7.77	1559.
24.	.01243	1.6959	1.038	267.0	453.4	16.493	5.96	8.32	1538.
26.	.01262	1.5970	1.019	281.2	470.5	17.177	6.13	8.83	1516.
28.	.01283	1.5009	.9937	296.2	488.6	17.848	6.28	9.32	1492.
30.	.01306	1.4095	.9652	311.9	507.8	18.508	6.41	9.79	1467.
32.	.01330	1.3244	.9354	328.3	527.8	19.154	6.51	10.25	1444.
34.	.01356	1.2413	.9027	345.3	548.7	19.789	6.60	10.70	1419.
36.	.01384	1.1621	.8679	363.0	570.6	20.414	6.67	11.14	1393.
38.	.01413	1.0897	.8318	381.3	593.3	21.027	6.72	11.54	1368.
40.	.01445	1.0217	.7948	400.0	616.7	21.629	6.75	11.92	1343.
42.	.01478	.9595	.7575	419.2	640.9	22.219	6.78	12.27	1318.
44.	.01514	.9010	.7206	438.8	665.8	22.797	6.80	12.61	1293.
46.	.01551	.8451	.6844	458.2	690.9	23.353	6.86	12.99	1265.
48.	.01591	.7995	.6491	478.4	717.1	23.912	6.89	13.30	1242.
50.	.01634	.7579	.6149	499.0	744.0	24.462	6.92	13.58	1219.
55.	.01749	.6755	.5359	551.1	813.4	25.783	6.96	14.11	1170.
60.	.01876	.6181	.4676	603.6	885.0	27.031	6.95	14.42	1132.
65.	.02014	.5822	.4097	655.4	957.5	28.189	6.94	14.54	1104.
70.	.02161	.5616	.3613	706.1	1030.2	29.268	6.95	14.54	1084.
75.	.02313	.5544	.3211	755.7	1102.7	30.268	6.97	14.44	1072.
80.	.02470	.5561	.2878	804.0	1174.5	31.195	7.01	14.28	1064.
90.	.02788	.5772	.2370	897.5	1315.7	32.860	7.16	13.97	1061.
100.	.03107	.6090	.2010	988.3	1454.3	34.319	7.37	13.78	1067.
110.	.03425	.6467	.1745	1079.6	1593.3	35.642	7.70	13.78	1076.
120.	.03739	.6882	.1543	1169.9	1730.9	36.840	7.97	13.78	1090.
140.	.04360	.7760	.1252	1352.9	2006.8	38.967	8.49	13.87	1126.
160.	.04967	.8660	.1055	1540.2	2285.2	40.824	8.93	14.01	1165.
180.	.05562	.9561	.0913	1732.1	2566.5	42.481	9.29	14.15	1206.
200.	.06149	1.0451	.0805	1928.0	2850.4	43.977	9.58	14.26	1248.
220.	.06709	1.1253	.0722	2127.1	3133.5	45.326	9.80	14.39	1286.
240.	.07285	1.2132	.0655	2329.3	3422.0	46.582	9.98	14.48	1327.
260.	.07856	1.3003	.0600	2533.8	3712.3	47.744	10.11	14.55	1368.
280.	.08424	1.3867	.0554	2740.1	4003.8	48.824	10.21	14.60	1408.
300.	.09005	1.4796	.0514	2949.5	4300.3	49.841	10.29	14.62	1450.
350.	.10407	1.6909	.0436	3471.2	5032.2	52.099	10.38	14.64	1545.
400.	.11800	1.9004	.0380	3994.1	5764.0	54.053	10.41	14.63	1634.
450.	.13188	2.1089	.0336	4517.0	6495.2	55.775	10.42	14.61	1720.
500.	.14572	2.3167	.0302	5039.6	7225.5	57.313	10.43	14.60	1801.
550.	.15954	2.5240	.0274	5562.1	7955.2	58.705	10.43	14.60	1879.
600.	.17335	2.7309	.0251	6085.0	8685.2	59.972	10.45	14.60	1954.
650.	.18714	2.9377	.0231	6608.4	9415.5	61.138	10.47	14.61	2025.
700.	.20092	3.1443	.0215	7133.1	10146.9	62.229	10.50	14.64	2094.
750.	.21470	3.3508	.0200	7659.5	10879.9	63.241	10.54	14.67	2160.
800.	.22847	3.5572	.0188	8187.8	11614.8	64.190	10.58	14.72	2224.
850.	.24224	3.7635	.0177	8718.7	12352.3	65.084	10.64	14.77	2286.
900.	.25600	3.9698	.0167	9252.6	13092.6	65.929	10.71	14.84	2345.
950.	.26976	4.1760	.0158	9789.9	13836.3	66.732	10.78	14.91	2403.
1000.	.28352	4.3823	.0150	10330.9	14583.7	67.498	10.87	15.00	2459.
1100.	.31104	4.7947	.0136	11427.1	16092.7	68.925	11.05	15.17	2566.
1200.	.33854	5.2070	.0125	12542.6	17620.8	70.247	11.25	15.37	2668.
1300.	.36605	5.6194	.0115	13678.7	19169.4	71.486	11.46	15.58	2764.
1400.	.39355	6.0317	.0107	14836.2	20739.4	72.657	11.68	15.80	2857.
1500.	.42105	6.4440	.0100	16015.3	22331.1	73.769	11.91	16.03	2945.
1600.	.44855	6.8563	.0094	17215.2	23943.5	74.803	12.12	16.24	3031.
1700.	.47606	7.2686	.0088	18436.7	25577.5	75.789	12.33	16.46	3114.
1800.	.50356	7.6809	.0083	19679.9	27233.3	76.734	12.55	16.67	3195.
2000.	.55858	8.5056	.0075	22233.1	30611.9	78.524	12.98	17.11	3348.
2200.	.61368	9.3302	.0068	24875.6	34080.8	80.170	13.50	17.65	3492.
2400.	.66897	10.1549	.0062	27637.5	37672.0	81.727	14.17	18.36	3627.
2600.	.72467	10.9796	.0058	30566.3	41436.4	83.232	15.12	19.38	3751.
2800.	.78115	11.8043	.0054	33734.7	45452.0	84.725	16.45	20.87	3868.
3000.	.83896	12.6290	.0050	37240.9	49825.3	86.242	18.30	22.95	3977.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

15.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 18.125	83.8091	1059.2	.24098	167.6538	.00632	119.00	347.24	.00076	1.27562	1.9529
19.	83.3404	1069.2	.23625	162.9833	.00650	122.85	316.39	.00076	1.27395	1.7890
20.	82.7922	1078.4	.23139	157.6737	.00670	127.11	287.23	.00076	1.27200	1.6335
22.	81.6553	1091.1	.22290	147.1729	.00712	135.58	242.84	.00077	1.26796	1.3923
24.	80.4717	1093.5	.21636	136.4690	.00761	141.22	210.95	.00076	1.26377	1.2431
26.	79.2220	1096.2	.20960	126.5139	.00805	144.65	186.87	.00074	1.25935	1.1403
28.	77.9234	1096.6	.20295	116.9526	.00850	146.47	168.22	.00073	1.25477	1.0700
30.	76.5738	1094.5	.19677	107.9301	.00894	147.12	153.32	.00071	1.25002	1.0200
32.	75.1829	1091.3	.19107	99.5692	.00939	145.84	141.17	.00068	1.24514	.9923
34.	73.7499	1085.3	.18551	91.5474	.00986	144.08	131.03	.00066	1.24012	.9731
36.	72.2740	1077.7	.18006	83.9930	.01033	141.99	122.39	.00064	1.23496	.9598
38.	70.7631	1070.0	.17483	77.1127	.01079	139.64	114.94	.00062	1.22970	.9499
40.	69.2216	1060.3	.17000	70.7229	.01124	137.13	108.42	.00060	1.22435	.9420
42.	67.6528	1051.1	.16521	64.9151	.01167	134.48	102.65	.00058	1.21892	.9362
44.	66.0635	1041.8	.16037	59.5251	.01211	131.80	97.51	.00057	1.21343	.9331
46.	64.4566	1034.2	.15483	54.4751	.01256	129.13	92.90	.00056	1.20790	.9348
48.	62.8366	1029.4	.14984	50.2396	.01292	126.49	88.73	.00054	1.20234	.9330
50.	61.2104	1024.5	.14513	46.3926	.01325	123.91	84.96	.00054	1.19678	.9311
55.	57.1885	1017.2	.13461	38.6301	.01387	117.95	77.10	.00053	1.18309	.9225
60.	53.3082	1016.2	.12617	32.9503	.01419	112.88	71.10	.00053	1.16999	.9082
65.	49.6537	1026.2	.11885	28.9075	.01417	109.61	66.61	.00055	1.15774	.8838
70.	46.2848	1046.2	.11235	25.9913	.01390	106.84	63.36	.00057	1.14652	.8625
75.	43.2302	1077.4	.10657	23.9685	.01340	104.29	61.09	.00060	1.13642	.8455
80.	40.4899	1117.3	.10135	22.5161	.01278	102.56	59.57	.00064	1.12740	.8295
90.	35.8679	1220.3	.09225	20.7036	.01145	103.59	58.12	.00074	1.11231	.7838
100.	32.1855	1343.3	.08473	19.6016	.01026	105.27	58.02	.00085	1.10039	.7593
110.	29.2008	1491.1	.07758	18.8848	.00924	109.42	59.10	.00098	1.09079	.7444
120.	26.7417	1643.3	.07236	18.4030	.00838	111.52	59.50	.00109	1.08293	.7349
140.	22.9374	1970.9	.06432	17.7995	.00704	117.98	61.68	.00134	1.07084	.7250
160.	20.1346	2314.4	.05868	17.4365	.00605	126.22	64.82	.00161	1.06200	.7193
180.	17.9781	2663.8	.05463	17.1881	.00531	135.42	68.41	.00192	1.05523	.7147
200.	16.2634	3012.3	.05167	16.9968	.00474	145.04	72.22	.00225	1.04987	.7102
220.	14.9048	3341.7	.04946	16.7727	.00431	154.75	76.11	.00260	1.04564	.7080
240.	13.7274	3680.8	.04786	16.6539	.00393	164.37	80.04	.00298	1.04198	.7053
260.	12.7288	4014.8	.04664	16.5511	.00363	173.78	83.96	.00338	1.03888	.7032
280.	11.8703	4341.0	.04569	16.4607	.00336	182.96	87.85	.00380	1.03623	.7012
300.	11.1050	4678.8	.04495	16.4309	.00313	191.88	91.70	.00425	1.03386	.6989
350.	9.6094	5454.5	.04374	16.2484	.00268	213.16	101.14	.00545	1.02926	.6947
400.	8.4748	6208.6	.04302	16.1058	.00236	233.20	110.27	.00677	1.02577	.6918
450.	7.5828	6950.5	.04256	15.9915	.00210	252.32	119.12	.00820	1.02304	.6897
500.	6.8624	7691.3	.04218	15.8979	.00190	270.78	127.71	.00973	1.02083	.6886
550.	6.2679	8429.8	.04188	15.8199	.00173	288.77	136.05	.01136	1.01901	.6877
600.	5.7688	9171.7	.04161	15.7541	.00159	306.44	144.17	.01310	1.01749	.6869
650.	5.3436	9917.3	.04135	15.6979	.00147	323.90	152.10	.01493	1.01619	.6862
700.	4.9770	10672.2	.04108	15.6492	.00137	341.25	159.84	.01686	1.01508	.6857
750.	4.6577	11435.6	.04081	15.6068	.00128	358.54	167.42	.01889	1.01410	.6852
800.	4.3769	12210.4	.04051	15.5695	.00121	375.81	174.86	.02100	1.01325	.6848
850.	4.1282	12998.2	.04020	15.5364	.00114	393.12	182.15	.02321	1.01249	.6845
900.	3.9062	13800.4	.03986	15.5069	.00108	410.49	189.32	.02550	1.01182	.6843
950.	3.7070	14617.9	.03951	15.4805	.00102	427.93	196.37	.02787	1.01121	.6843
1000.	3.5271	15451.3	.03913	15.4566	.00097	445.47	203.32	.03032	1.01067	.6844
1100.	3.2151	17155.1	.03839	15.4153	.00088	475.56	216.92	.03509	1.00972	.6921
1200.	2.9538	18917.9	.03762	15.3807	.00081	511.00	230.16	.04052	1.00893	.6923
1300.	2.7319	20738.7	.03685	15.3514	.00075	546.89	243.09	.04625	1.00826	.6926
1400.	2.5410	22614.6	.03609	15.3263	.00070	583.17	255.73	.05228	1.00768	.6930
1500.	2.3750	24541.1	.03535	15.3045	.00065	619.78	268.11	.05861	1.00717	.6934
1600.	2.2294	26497.3	.03468	15.2854	.00061	656.28	280.25	.06524	1.00673	.6937
1700.	2.1006	28492.4	.03404	15.2685	.00058	693.00	292.15	.07216	1.00634	.6938
1800.	1.9859	30528.6	.03343	15.2533	.00055	730.13	303.83	.07939	1.00600	.6938
2000.	1.7902	34759.6	.03225	15.2271	.00049	807.35	326.57	.09487	1.00540	.6922
2200.	1.6295	39363.8	.03098	15.2037	.00045	894.70	344.89	.11202	1.00492	.6802
2400.	1.4948	44610.5	.02949	15.1799	.00041	1002.88	366.25	.13155	1.00451	.6705
2600.	1.3799	50928.8	.02764	15.1511	.00038	1148.19	387.18	.15452	1.00416	.6537
2800.	1.2802	58878.9	.02542	15.1113	.00035	1351.61	407.84	.18217	1.00386	.6296
3000.	1.1919	69105.9	.02291	15.0531	.00033	1637.26	428.42	.21551	1.00360	.6004

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

16.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 18.378	.01188	2.0484	1.066	231.4	421.5	14.411	5.28	6.71	1615.
19.	.01193	2.0171	1.066	234.9	425.7	14.637	5.37	6.89	1609.
20.	.01200	1.9667	1.065	240.7	432.8	14.998	5.51	7.17	1600.
22.	.01217	1.8661	1.058	253.0	447.6	15.709	5.75	7.70	1581.
24.	.01234	1.7664	1.045	266.1	463.6	16.402	5.96	8.22	1561.
26.	.01253	1.6642	1.031	280.1	480.5	17.077	6.13	8.74	1540.
28.	.01273	1.5644	1.007	294.8	498.5	17.742	6.28	9.22	1515.
30.	.01294	1.4775	.9796	310.3	517.3	18.394	6.41	9.67	1493.
32.	.01317	1.3906	.9504	326.4	537.1	19.032	6.52	10.12	1470.
34.	.01342	1.3072	.9192	343.1	557.8	19.659	6.61	10.56	1446.
36.	.01368	1.2299	.8857	360.5	579.4	20.275	6.68	10.97	1422.
38.	.01396	1.1571	.8508	378.4	601.7	20.879	6.74	11.37	1397.
40.	.01425	1.0890	.8151	396.8	624.8	21.472	6.77	11.73	1373.
42.	.01456	1.0265	.7789	415.6	648.6	22.052	6.79	12.06	1350.
44.	.01490	.9676	.7429	434.7	673.1	22.620	6.82	12.39	1326.
46.	.01525	.9144	.7075	453.7	697.7	23.166	6.88	12.73	1301.
48.	.01562	.8633	.6729	473.6	723.4	23.715	6.92	13.05	1277.
50.	.01601	.8176	.6391	493.7	749.8	24.254	6.95	13.34	1253.
55.	.01706	.7332	.5608	544.8	817.8	25.550	6.99	13.86	1206.
60.	.01823	.6719	.4922	596.6	888.2	26.776	6.98	14.17	1168.
65.	.01949	.6301	.4336	647.7	959.5	27.916	6.97	14.34	1138.
70.	.02083	.6056	.3840	698.0	1031.3	28.981	6.97	14.37	1117.
75.	.02224	.5943	.3425	747.3	1103.1	29.971	7.00	14.31	1103.
80.	.02368	.5913	.3076	795.6	1174.4	30.892	7.04	14.22	1093.
90.	.02663	.6071	.2539	889.3	1315.3	32.552	7.19	13.96	1086.
100.	.02959	.6361	.2155	980.4	1453.9	34.012	7.39	13.79	1089.
110.	.03255	.6715	.1872	1072.2	1593.0	35.337	7.72	13.81	1096.
120.	.03550	.7105	.1654	1163.0	1730.9	36.537	7.99	13.81	1108.
140.	.04131	.7966	.1342	1346.8	2007.7	38.670	8.51	13.91	1141.
160.	.04700	.8856	.1130	1534.9	2287.0	40.533	8.95	14.05	1179.
180.	.05259	.9744	.0977	1727.5	2569.0	42.195	9.31	14.19	1219.
200.	.05810	1.0633	.0861	1924.1	2853.7	43.695	9.59	14.30	1259.
220.	.06353	1.1504	.0770	2123.9	3140.4	45.061	9.82	14.39	1299.
240.	.06875	1.2299	.0700	2326.2	3426.1	46.305	9.99	14.50	1336.
260.	.07411	1.3170	.0641	2531.0	3716.8	47.468	10.12	14.58	1377.
280.	.07945	1.4035	.0592	2737.5	4008.7	48.550	10.22	14.62	1417.
300.	.08491	1.4973	.0548	2947.3	4305.9	49.569	10.30	14.64	1459.
350.	.09806	1.7085	.0466	3469.5	5038.5	51.828	10.38	14.65	1553.
400.	.11113	1.9180	.0405	3992.8	5770.8	53.784	10.41	14.64	1642.
450.	.12415	2.1264	.0359	4516.0	6502.3	55.507	10.42	14.62	1727.
500.	.13713	2.3341	.0322	5038.8	7232.9	57.045	10.43	14.61	1808.
550.	.15009	2.5413	.0292	5561.4	7962.8	58.437	10.44	14.60	1885.
600.	.16303	2.7482	.0268	6084.5	8693.0	59.705	10.45	14.60	1960.
650.	.17596	2.9549	.0247	6608.0	9423.4	60.871	10.47	14.62	2031.
700.	.18889	3.1614	.0229	7132.7	10154.9	61.962	10.50	14.64	2100.
750.	.20180	3.3678	.0214	7659.2	10888.0	62.975	10.54	14.67	2166.
800.	.21471	3.5742	.0200	8187.6	11623.0	63.924	10.58	14.72	2229.
850.	.22762	3.7805	.0188	8718.6	12360.5	64.817	10.64	14.77	2291.
900.	.24052	3.9867	.0178	9252.5	13100.9	65.663	10.71	14.84	2350.
950.	.25342	4.1929	.0168	9789.8	13844.6	66.466	10.78	14.91	2408.
1000.	.26632	4.3991	.0160	10330.8	14592.0	67.232	10.87	15.00	2464.
1100.	.29212	4.8114	.0145	11427.2	16101.1	68.659	11.05	15.17	2571.
1200.	.31791	5.2237	.0133	12542.7	17629.2	69.981	11.25	15.37	2672.
1300.	.34369	5.6360	.0123	13678.8	19177.9	71.220	11.46	15.58	2768.
1400.	.36948	6.0483	.0114	14836.3	20748.0	72.391	11.68	15.80	2861.
1500.	.39526	6.4606	.0107	16015.5	22339.6	73.503	11.91	16.03	2949.
1600.	.42104	6.8728	.0100	17215.3	23952.0	74.537	12.12	16.24	3035.
1700.	.44682	7.2851	.0094	18436.8	25586.0	75.523	12.33	16.46	3118.
1800.	.47261	7.6974	.0089	19680.0	27241.8	76.468	12.55	16.67	3198.
2000.	.52419	8.5219	.0080	22232.9	30620.0	78.258	12.98	17.11	3352.
2200.	.57584	9.3465	.0073	24874.3	34087.8	79.903	13.49	17.64	3495.
2400.	.62767	10.1712	.0067	27633.2	37676.0	81.458	14.15	18.34	3630.
2600.	.67987	10.9958	.0062	30555.8	41433.7	82.962	15.08	19.34	3755.
2800.	.73278	11.8205	.0057	33711.9	45436.4	84.449	16.38	20.78	3871.
3000.	.78689	12.6451	.0053	37196.8	49787.0	85.959	18.18	22.80	3981.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

16.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 18.378	84.1703	1085.8	.24014	172.4170	.00618	121.41	353.30	.00077	1.27691	1.9541
19.	83.8438	1093.2	.23686	169.1204	.00630	124.12	330.57	.00077	1.27574	1.8356
20.	83.3088	1103.2	.23204	163.8434	.00650	128.51	299.59	.00077	1.27384	1.6714
22.	82.2006	1117.5	.22362	153.3933	.00689	137.24	252.55	.00078	1.26990	1.4179
24.	81.0422	1125.8	.21637	143.1502	.00730	143.07	218.82	.00077	1.26579	1.2568
26.	79.8365	1126.0	.21059	132.8603	.00776	146.72	193.63	.00076	1.26152	1.1529
28.	78.5728	1125.7	.20401	122.9176	.00819	148.69	174.06	.00074	1.25706	1.0796
30.	77.2670	1127.1	.19786	114.1641	.00858	149.50	158.54	.00072	1.25246	1.0256
32.	75.9211	1124.4	.19212	105.5769	.00900	148.34	145.91	.00069	1.24773	.9957
34.	74.5334	1119.4	.18671	97.4322	.00943	146.68	135.39	.00067	1.24286	.9748
36.	73.1104	1114.2	.18137	89.9185	.00985	144.69	126.48	.00065	1.23788	.9593
38.	71.6542	1107.6	.17627	82.9097	.01026	142.44	118.81	.00063	1.23280	.9481
40.	70.1694	1099.3	.17160	76.4173	.01067	140.02	112.12	.00061	1.22764	.9389
42.	68.6604	1091.3	.16696	70.4825	.01105	137.45	106.22	.00060	1.22240	.9321
44.	67.1339	1083.3	.16225	64.9599	.01144	134.84	100.98	.00058	1.21712	.9278
46.	65.5916	1079.2	.15683	59.9771	.01180	132.23	96.27	.00057	1.21180	.9268
48.	64.0397	1072.6	.15193	55.2845	.01217	129.66	92.03	.00056	1.20647	.9266
50.	62.4792	1066.6	.14729	51.0822	.01251	127.13	88.19	.00055	1.20112	.9257
55.	58.6105	1061.7	.13693	42.9730	.01305	121.24	80.14	.00054	1.18792	.9158
60.	54.8590	1060.9	.12859	36.8625	.01335	116.24	73.92	.00054	1.17521	.9009
65.	51.3040	1068.9	.12127	32.3268	.01341	112.74	69.21	.00055	1.16326	.8800
70.	47.9986	1087.9	.11472	29.0695	.01321	109.89	65.71	.00057	1.15222	.8594
75.	44.9729	1117.1	.10863	26.7252	.01281	107.33	63.20	.00060	1.14217	.8430
80.	42.2333	1154.1	.10348	24.9716	.01232	105.44	61.47	.00063	1.13313	.8288
90.	37.5586	1253.7	.09408	22.8006	.01114	106.24	59.66	.00073	1.11782	.7841
100.	33.7906	1375.1	.08628	21.4951	.01003	107.69	59.30	.00083	1.10558	.7591
110.	30.7187	1521.3	.07890	20.6272	.00907	111.93	60.36	.00095	1.09567	.7445
120.	28.1711	1671.3	.07349	20.0154	.00826	113.75	60.59	.00105	1.08750	.7357
140.	24.2091	1998.3	.06519	19.2857	.00696	119.80	62.52	.00128	1.07487	.7258
160.	21.2755	2341.5	.05937	18.8405	.00600	127.71	65.48	.00154	1.06559	.7203
180.	19.0141	2690.3	.05520	18.5275	.00527	136.63	68.95	.00182	1.05848	.7159
200.	17.2120	3039.8	.05213	18.3010	.00470	146.03	72.66	.00214	1.05283	.7115
220.	15.7408	3384.8	.04983	18.1087	.00425	155.57	76.49	.00247	1.04824	.7077
240.	14.5460	3707.4	.04817	17.8896	.00391	165.05	80.36	.00282	1.04452	.7060
260.	13.4930	4039.6	.04697	17.7700	.00361	174.36	84.24	.00319	1.04125	.7042
280.	12.5871	4367.0	.04600	17.6655	.00335	183.45	88.10	.00359	1.03845	.7022
300.	11.7769	4707.3	.04523	17.6334	.00311	192.31	91.92	.00402	1.03594	.6998
350.	10.1977	5483.5	.04397	17.4229	.00267	213.47	101.31	.00514	1.03107	.6954
400.	8.9985	6238.0	.04322	17.2590	.00235	233.44	110.41	.00638	1.02738	.6923
450.	8.0551	6980.1	.04273	17.1280	.00209	252.51	119.24	.00772	1.02448	.6902
500.	7.2924	7721.1	.04233	17.0209	.00189	270.93	127.81	.00916	1.02215	.6890
550.	6.6628	8459.7	.04202	16.9319	.00173	288.90	136.14	.01069	1.02022	.6879
600.	6.1338	9201.7	.04174	16.8568	.00159	306.55	144.25	.01232	1.01860	.6872
650.	5.6830	9947.4	.04147	16.7926	.00147	324.00	152.16	.01404	1.01723	.6864
700.	5.2942	10702.4	.04119	16.7372	.00137	341.34	159.90	.01585	1.01604	.6858
750.	4.9554	11465.9	.04091	16.6888	.00128	358.62	167.48	.01775	1.01501	.6853
800.	4.6574	12240.7	.04060	16.6464	.00120	375.89	174.91	.01974	1.01410	.6849
850.	4.3933	13028.7	.04028	16.6087	.00113	393.19	182.20	.02181	1.01330	.6846
900.	4.1576	13831.0	.03994	16.5752	.00107	410.55	189.36	.02396	1.01258	.6844
950.	3.9459	14648.7	.03958	16.5451	.00102	427.99	196.41	.02618	1.01194	.6844
1000.	3.7548	15482.3	.03920	16.5179	.00097	445.52	203.36	.02848	1.01136	.6845
1100.	3.4233	17186.4	.03845	16.4709	.00088	475.56	216.95	.03296	1.01035	.6922
1200.	3.1456	18949.6	.03768	16.4316	.00081	511.00	230.19	.03805	1.00951	.6924
1300.	2.9096	20770.8	.03690	16.3984	.00075	546.89	243.11	.04342	1.00879	.6927
1400.	2.7065	22647.1	.03614	16.3698	.00070	583.17	255.75	.04908	1.00818	.6931
1500.	2.5300	24574.0	.03540	16.3450	.00065	619.78	268.13	.05502	1.00764	.6934
1600.	2.3751	26530.4	.03472	16.3233	.00061	656.27	280.26	.06124	1.00717	.6937
1700.	2.2380	28525.5	.03408	16.3042	.00058	692.98	292.17	.06773	1.00676	.6939
1800.	2.1159	30561.1	.03347	16.2870	.00055	730.07	303.85	.07451	1.00639	.6938
2000.	1.9077	34788.0	.03229	16.2573	.00049	807.10	326.58	.08902	1.00576	.6923
2200.	1.7366	39379.2	.03103	16.2310	.00045	893.92	344.89	.10508	1.00524	.6804
2400.	1.5932	44594.3	.02955	16.2047	.00041	1000.87	366.24	.12333	1.00481	.6710
2600.	1.4709	50848.8	.02773	16.1734	.00038	1143.73	387.17	.14475	1.00444	.6546
2800.	1.3647	58685.5	.02555	16.1310	.00035	1342.83	407.82	.17048	1.00412	.6311
3000.	1.2708	68730.0	.02308	16.0698	.00033	1621.58	428.38	.20147	1.00383	.6023

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

17.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 18.627	.01183	2.0958	1.073	232.6	433.7	14.429	5.30	6.74	1632.
19.	.01186	2.0773	1.073	234.6	436.2	14.563	5.35	6.84	1628.
20.	.01193	2.0277	1.072	240.3	443.2	14.921	5.50	7.11	1620.
22.	.01209	1.9285	1.066	252.5	457.9	15.626	5.75	7.64	1601.
24.	.01226	1.8300	1.055	265.4	473.7	16.313	5.95	8.14	1582.
26.	.01243	1.7283	1.042	279.1	490.5	16.982	6.13	8.65	1562.
28.	.01263	1.6350	1.020	293.6	508.3	17.640	6.28	9.12	1541.
30.	.01283	1.5434	.9936	308.8	527.0	18.285	6.41	9.57	1518.
32.	.01305	1.4575	.9647	324.7	546.5	18.917	6.52	10.00	1495.
34.	.01328	1.3742	.9347	341.1	567.0	19.536	6.61	10.43	1472.
36.	.01353	1.2966	.9026	358.2	588.2	20.144	6.69	10.83	1449.
38.	.01379	1.2218	.8688	375.8	610.3	20.740	6.75	11.22	1425.
40.	.01407	1.1543	.8342	393.8	633.1	21.324	6.78	11.56	1402.
42.	.01437	1.0920	.7991	412.3	656.5	21.896	6.81	11.88	1380.
44.	.01468	1.0331	.7640	431.1	680.6	22.456	6.84	12.19	1357.
46.	.01500	.9790	.7293	449.7	704.8	22.993	6.90	12.52	1333.
48.	.01535	.9290	.6953	469.2	730.1	23.532	6.94	12.82	1310.
50.	.01571	.8825	.6622	489.0	756.0	24.061	6.97	13.10	1288.
55.	.01669	.7913	.5845	539.2	822.9	25.336	7.01	13.62	1240.
60.	.01776	.7248	.5157	590.2	892.2	26.543	7.00	13.95	1202.
65.	.01893	.6799	.4564	640.7	962.4	27.665	6.99	14.13	1172.
70.	.02016	.6510	.4059	690.5	1033.3	28.717	7.00	14.20	1149.
75.	.02146	.6352	.3631	739.5	1104.3	29.697	7.02	14.19	1133.
80.	.02279	.6290	.3270	787.7	1175.2	30.611	7.06	14.13	1122.
90.	.02553	.6384	.2707	881.5	1315.6	32.266	7.21	13.94	1111.
100.	.02831	.6642	.2299	973.0	1454.2	33.726	7.41	13.79	1111.
110.	.03107	.6968	.1997	1065.1	1593.4	35.051	7.74	13.82	1115.
120.	.03383	.7344	.1766	1156.3	1731.5	36.253	8.01	13.84	1127.
140.	.03929	.8176	.1433	1340.9	2008.9	38.391	8.52	13.95	1157.
160.	.04466	.9050	.1206	1529.8	2289.0	40.260	8.96	14.09	1193.
180.	.04992	.9932	.1041	1723.1	2571.8	41.926	9.33	14.22	1231.
200.	.05511	1.0817	.0917	1920.3	2857.2	43.429	9.61	14.33	1270.
220.	.06023	1.1688	.0820	2120.7	3144.6	44.799	9.83	14.42	1309.
240.	.06529	1.2552	.0742	2323.5	3433.5	46.056	10.00	14.48	1348.
260.	.07019	1.3338	.0682	2528.2	3721.4	47.209	10.13	14.59	1386.
280.	.07521	1.4203	.0629	2735.0	4013.7	48.291	10.22	14.64	1426.
300.	.08038	1.5151	.0583	2945.2	4311.6	49.312	10.30	14.66	1468.
350.	.09276	1.7262	.0495	3467.9	5044.9	51.574	10.39	14.66	1561.
400.	.10507	1.9356	.0430	3991.5	5777.7	53.531	10.42	14.65	1650.
450.	.11732	2.1439	.0381	4515.0	6509.5	55.255	10.42	14.62	1734.
500.	.12955	2.3515	.0342	5038.1	7240.3	56.794	10.43	14.61	1815.
550.	.14174	2.5586	.0310	5560.8	7970.5	58.186	10.44	14.60	1892.
600.	.15393	2.7654	.0284	6084.1	8700.8	59.454	10.45	14.61	1966.
650.	.16610	2.9721	.0262	6607.6	9431.3	60.620	10.47	14.62	2037.
700.	.17826	3.1785	.0243	7132.5	10162.9	61.711	10.50	14.64	2105.
750.	.19042	3.3849	.0227	7659.0	10896.1	62.724	10.54	14.68	2171.
800.	.20257	3.5912	.0213	8187.4	11631.1	63.673	10.59	14.72	2235.
850.	.21472	3.7974	.0200	8718.5	12368.7	64.567	10.64	14.77	2296.
900.	.22687	4.0036	.0189	9252.5	13109.2	65.412	10.71	14.84	2355.
950.	.23901	4.2098	.0179	9789.8	13853.0	66.215	10.79	14.91	2413.
1000.	.25115	4.4159	.0170	10330.9	14600.4	66.981	10.87	15.00	2468.
1100.	.27543	4.8282	.0154	11427.2	16109.5	68.409	11.05	15.17	2575.
1200.	.29970	5.2404	.0142	12542.8	17637.7	69.731	11.25	15.37	2676.
1300.	.32397	5.6526	.0131	13679.0	19186.4	70.970	11.46	15.58	2772.
1400.	.34823	6.0648	.0121	14836.5	20756.5	72.141	11.68	15.80	2864.
1500.	.37250	6.4770	.0113	16015.7	22348.2	73.253	11.91	16.03	2953.
1600.	.39676	6.8892	.0106	17215.6	23960.6	74.287	12.12	16.24	3038.
1700.	.42103	7.3015	.0100	18437.1	25594.6	75.273	12.33	16.46	3121.
1800.	.44530	7.7137	.0094	19680.2	27250.2	76.218	12.55	16.67	3201.
2000.	.49385	8.5382	.0085	22232.8	30628.1	78.008	12.98	17.11	3355.
2200.	.54246	9.3628	.0077	24873.1	34094.8	79.652	13.48	17.63	3499.
2400.	.59123	10.1873	.0071	27629.5	37680.3	81.206	14.14	18.32	3633.
2600.	.64034	11.0119	.0065	30546.2	41432.0	82.707	15.04	19.30	3758.
2800.	.69010	11.8366	.0061	33691.3	45422.9	84.191	16.31	20.70	3875.
3000.	.74096	12.6612	.0057	37156.6	49752.9	85.693	18.06	22.67	3985.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

17.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 18.627	84.5240	1112.0	.23939	177.1450	.00606	123.75	359.37	.00078	1.27817	1.9563
19.	84.3323	1116.6	.23747	175.1853	.00613	125.36	345.27	.00078	1.27748	1.8841
20.	83.8095	1127.4	.23268	169.9398	.00631	129.89	312.35	.00078	1.27562	1.7109
22.	82.7276	1143.3	.22431	159.5390	.00668	138.86	262.53	.00079	1.27177	1.4446
24.	81.5983	1153.0	.21712	149.3236	.00706	144.90	226.95	.00079	1.26776	1.2755
26.	80.4247	1154.1	.21150	138.9956	.00750	148.73	200.48	.00077	1.26360	1.1665
28.	79.1984	1158.0	.20502	129.4868	.00788	150.87	180.01	.00075	1.25927	1.0884
30.	77.9306	1158.3	.19893	120.2751	.00826	151.81	163.80	.00073	1.25479	1.0325
32.	76.6235	1157.7	.19309	111.6772	.00864	150.75	150.65	.00071	1.25019	.9993
34.	75.2796	1153.9	.18780	103.4473	.00904	149.20	139.75	.00068	1.24548	.9766
36.	73.9026	1149.7	.18260	95.8186	.00942	147.30	130.54	.00066	1.24065	.9598
38.	72.4948	1143.4	.17759	88.5727	.00981	145.13	122.65	.00064	1.23573	.9477
40.	71.0617	1136.6	.17305	82.0291	.01017	142.79	115.78	.00063	1.23074	.9372
42.	69.6052	1130.0	.16855	76.0086	.01051	140.29	109.73	.00061	1.22568	.9292
44.	68.1337	1123.4	.16397	70.3863	.01085	137.74	104.37	.00060	1.22058	.9239
46.	66.6484	1120.4	.15866	65.2516	.01118	135.19	99.57	.00058	1.21545	.9222
48.	65.1547	1116.0	.15386	60.5283	.01149	132.67	95.25	.00057	1.21030	.9204
50.	63.6570	1111.2	.14931	56.1788	.01179	130.20	91.34	.00056	1.20515	.9189
55.	59.9230	1105.4	.13908	47.4198	.01233	124.37	83.09	.00055	1.19238	.9102
60.	56.2917	1103.7	.13081	40.7976	.01264	119.37	76.68	.00055	1.18005	.8962
65.	52.8312	1111.9	.12353	35.9185	.01271	115.73	71.75	.00056	1.16838	.8761
70.	49.5912	1129.6	.11694	32.2817	.01257	112.82	68.04	.00058	1.15753	.8566
75.	46.6014	1156.8	.11097	29.6019	.01227	110.25	65.31	.00060	1.14757	.8407
80.	43.8726	1192.4	.10552	27.5957	.01185	108.24	63.37	.00063	1.13854	.8274
90.	39.1653	1287.9	.09585	25.0017	.01083	108.83	61.22	.00072	1.12306	.7843
100.	35.3282	1407.4	.08778	23.4660	.00980	110.07	60.58	.00081	1.11056	.7589
110.	32.1803	1551.8	.08017	22.4230	.00891	114.39	61.61	.00093	1.10037	.7445
120.	29.5562	1701.1	.07461	21.7064	.00813	115.95	61.69	.00102	1.09193	.7361
140.	25.4489	2025.8	.06606	20.8071	.00688	121.62	63.36	.00123	1.07881	.7267
160.	22.3930	2368.3	.06006	20.2664	.00595	129.21	66.16	.00147	1.06912	.7213
180.	20.0305	2717.4	.05575	19.8949	.00523	137.87	69.50	.00174	1.06167	.7171
200.	18.1446	3067.6	.05259	19.6265	.00467	147.05	73.12	.00204	1.05575	.7128
220.	16.6031	3413.8	.05022	19.4055	.00423	156.42	76.88	.00235	1.05093	.7090
240.	15.3152	3754.3	.04842	19.2232	.00386	165.76	80.70	.00269	1.04692	.7051
260.	14.2475	4066.5	.04726	19.0034	.00359	174.96	84.53	.00303	1.04360	.7049
280.	13.2954	4393.1	.04630	18.8835	.00333	183.96	88.36	.00340	1.04064	.7032
300.	12.4408	4735.9	.04551	18.8497	.00309	192.75	92.15	.00381	1.03799	.7007
350.	10.7800	5512.6	.04420	18.6088	.00266	213.79	101.49	.00487	1.03286	.6961
400.	9.5176	6267.4	.04342	18.4222	.00234	233.69	110.56	.00604	1.02897	.6929
450.	8.5234	7009.7	.04290	18.2733	.00209	252.71	119.36	.00730	1.02592	.6906
500.	7.7193	7750.9	.04249	18.1518	.00188	271.09	127.91	.00865	1.02345	.6893
550.	7.0549	8489.7	.04216	18.0509	.00172	289.03	136.22	.01010	1.02142	.6882
600.	6.4965	9231.7	.04186	17.9658	.00158	306.67	144.33	.01163	1.01971	.6874
650.	6.0205	9977.5	.04158	17.8932	.00147	324.11	152.23	.01326	1.01826	.6866
700.	5.6097	10732.6	.04130	17.8305	.00136	341.43	159.96	.01496	1.01700	.6860
750.	5.2515	11496.1	.04100	17.7759	.00128	358.70	167.53	.01676	1.01591	.6854
800.	4.9365	12271.1	.04069	17.7279	.00120	375.96	174.95	.01863	1.01495	.6850
850.	4.6572	13059.2	.04037	17.6854	.00113	393.25	182.24	.02057	1.01410	.6847
900.	4.4079	13861.6	.04002	17.6475	.00107	410.61	189.40	.02260	1.01334	.6845
950.	4.1840	14679.4	.03965	17.6135	.00102	428.04	196.45	.02469	1.01266	.6845
1000.	3.9817	15513.2	.03927	17.5829	.00097	445.57	203.39	.02686	1.01205	.6846
1100.	3.6307	17217.7	.03851	17.5298	.00088	475.56	216.98	.03107	1.01098	.6924
1200.	3.3367	18981.2	.03773	17.4856	.00081	511.00	230.21	.03587	1.01009	.6925
1300.	3.0867	20802.8	.03695	17.4480	.00075	546.89	243.14	.04093	1.00933	.6928
1400.	2.8716	22679.5	.03618	17.4159	.00070	583.17	255.77	.04626	1.00868	.6931
1500.	2.6846	24606.7	.03544	17.3880	.00065	619.77	268.15	.05185	1.00811	.6935
1600.	2.5204	26563.4	.03476	17.3635	.00061	656.26	280.28	.05770	1.00761	.6938
1700.	2.3751	28558.5	.03411	17.3419	.00058	692.95	292.18	.06382	1.00717	.6939
1800.	2.2457	30593.7	.03350	17.3226	.00054	730.01	303.87	.07020	1.00678	.6939
2000.	2.0249	34816.9	.03233	17.2893	.00049	806.88	326.60	.08385	1.00611	.6924
2200.	1.8435	39396.2	.03107	17.2600	.00045	893.21	344.89	.09895	1.00557	.6806
2400.	1.6914	44582.7	.02961	17.2309	.00041	999.04	366.24	.11609	1.00511	.6715
2600.	1.5617	50779.1	.02782	17.1971	.00038	1139.67	387.16	.13615	1.00471	.6555
2800.	1.4491	58512.6	.02567	17.1520	.00035	1334.85	407.80	.16019	1.00437	.6324
3000.	1.3496	68391.1	.02324	17.0876	.00033	1607.30	428.35	.18913	1.00407	.6041

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

18.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 18.874	.01178	2.1426	1.080	233.7	445.8	14.447	5.33	6.76	1648.
19.	.01179	2.1364	1.080	234.4	446.7	14.492	5.35	6.79	1647.
20.	.01186	2.0875	1.080	240.1	453.6	14.847	5.49	7.06	1639.
22.	.01201	1.9897	1.075	252.0	468.3	15.547	5.74	7.58	1621.
24.	.01217	1.8923	1.064	264.8	483.9	16.228	5.95	8.07	1603.
26.	.01235	1.7964	1.049	278.3	500.5	16.892	6.12	8.55	1584.
28.	.01253	1.7001	1.032	292.6	518.1	17.542	6.28	9.04	1564.
30.	.01273	1.6057	1.007	307.5	536.6	18.182	6.41	9.48	1541.
32.	.01294	1.5226	.9789	323.1	556.0	18.807	6.52	9.89	1520.
34.	.01316	1.4380	.9496	339.3	576.2	19.419	6.62	10.31	1497.
36.	.01339	1.3617	.9186	356.1	597.2	20.020	6.70	10.70	1475.
38.	.01364	1.2873	.8859	373.4	619.0	20.609	6.76	11.07	1452.
40.	.01391	1.2192	.8523	391.2	641.5	21.185	6.80	11.41	1430.
42.	.01419	1.1548	.8181	409.3	664.6	21.749	6.83	11.72	1408.
44.	.01448	1.0969	.7838	427.8	688.4	22.301	6.86	12.02	1387.
46.	.01478	1.0427	.7499	446.1	712.2	22.830	6.91	12.34	1364.
48.	.01511	.9914	.7165	465.3	737.2	23.362	6.96	12.63	1342.
50.	.01544	.9454	.6840	484.7	762.7	23.882	6.99	12.89	1321.
55.	.01636	.8486	.6069	534.2	828.6	25.138	7.04	13.42	1272.
60.	.01735	.7794	.5381	584.4	896.8	26.327	7.03	13.74	1234.
65.	.01843	.7289	.4784	634.3	966.1	27.434	7.02	13.95	1204.
70.	.01958	.6962	.4270	683.7	1036.1	28.473	7.02	14.05	1180.
75.	.02078	.6762	.3832	732.4	1106.4	29.443	7.05	14.08	1162.
80.	.02202	.6677	.3459	780.4	1176.7	30.351	7.09	14.04	1150.
90.	.02457	.6711	.2872	874.2	1316.6	31.998	7.23	13.91	1136.
100.	.02717	.6927	.2442	965.9	1455.0	33.457	7.43	13.79	1134.
110.	.02977	.7235	.2122	1058.4	1594.3	34.783	7.76	13.83	1136.
120.	.03237	.7587	.1876	1149.9	1732.5	35.986	8.02	13.86	1145.
140.	.03751	.8391	.1523	1335.2	2010.5	38.128	8.54	13.98	1172.
160.	.04258	.9252	.1281	1524.8	2291.2	40.001	8.98	14.12	1206.
180.	.04756	1.0128	.1106	1718.8	2574.8	41.672	9.34	14.26	1243.
200.	.05246	1.1000	.0974	1916.6	2860.9	43.179	9.63	14.37	1281.
220.	.05730	1.1874	.0870	2117.5	3148.9	44.551	9.85	14.45	1320.
240.	.06208	1.2728	.0786	2320.8	3438.3	45.811	10.02	14.51	1358.
260.	.06670	1.3507	.0720	2525.8	3726.4	46.965	10.14	14.58	1394.
280.	.07145	1.4373	.0667	2732.6	4018.7	48.048	10.23	14.66	1435.
300.	.07635	1.5332	.0618	2943.1	4317.4	49.071	10.31	14.67	1477.
350.	.08806	1.7441	.0524	3466.3	5051.3	51.334	10.39	14.67	1569.
400.	.09968	1.9533	.0456	3990.3	5784.6	53.292	10.42	14.65	1657.
450.	.11126	2.1615	.0404	4514.1	6516.7	55.017	10.43	14.63	1741.
500.	.12281	2.3690	.0362	5037.3	7247.8	56.556	10.44	14.61	1821.
550.	.13433	2.5760	.0329	5560.2	7978.2	57.949	10.44	14.61	1898.
600.	.14584	2.7827	.0301	6083.6	8708.6	59.217	10.45	14.61	1972.
650.	.15733	2.9893	.0278	6607.3	9439.2	60.384	10.47	14.62	2043.
700.	.16882	3.1956	.0258	7132.2	10171.0	61.475	10.50	14.64	2111.
750.	.18030	3.4019	.0240	7658.8	10904.2	62.488	10.54	14.68	2176.
800.	.19178	3.6082	.0225	8187.3	11639.3	63.437	10.59	14.72	2240.
850.	.20325	3.8143	.0212	8718.4	12377.0	64.331	10.64	14.78	2301.
900.	.21472	4.0205	.0200	9252.5	13117.5	65.176	10.71	14.84	2360.
950.	.22619	4.2266	.0189	9789.8	13861.3	65.979	10.79	14.92	2417.
1000.	.23766	4.4327	.0180	10330.9	14608.7	66.745	10.87	15.00	2473.
1100.	.26059	4.8448	.0164	11427.3	16117.9	68.173	11.05	15.18	2579.
1200.	.28351	5.2570	.0150	12543.0	17646.1	69.495	11.25	15.37	2680.
1300.	.30643	5.6691	.0138	13679.2	19194.9	70.734	11.46	15.58	2776.
1400.	.32935	6.0812	.0128	14836.7	20765.0	71.905	11.68	15.80	2868.
1500.	.35227	6.4934	.0120	16015.9	22356.7	73.017	11.91	16.03	2957.
1600.	.37518	6.9056	.0112	17215.8	23969.1	74.051	12.12	16.24	3042.
1700.	.39810	7.3178	.0106	18437.3	25603.1	75.037	12.33	16.46	3125.
1800.	.42102	7.7300	.0100	19680.4	27258.7	75.982	12.55	16.67	3205.
2000.	.46687	8.5544	.0090	22232.7	30636.3	77.772	12.98	17.10	3358.
2200.	.51278	9.3789	.0082	24872.1	34102.1	79.415	13.48	17.62	3502.
2400.	.55883	10.2034	.0075	27626.1	37685.0	80.969	14.12	18.30	3636.
2600.	.60520	11.0280	.0069	30537.6	41431.1	82.467	15.01	19.26	3762.
2800.	.65216	11.8525	.0064	33672.4	45411.3	83.947	16.25	20.63	3878.
3000.	.70014	12.6772	.0060	37119.9	49722.4	85.443	17.95	22.55	3989.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

18.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 18.874	84.8704	1137.7	.23871	181.8403	.00594	126.04	365.44	.00079	1.27940	1.9593
19.	84.8070	1139.4	.23807	181.1834	.00596	126.58	360.52	.00079	1.27918	1.9346
20.	84.2955	1151.0	.23330	175.9684	.00614	131.23	325.55	.00079	1.27735	1.7520
22.	83.2381	1168.4	.22497	165.6158	.00649	140.44	272.79	.00080	1.27359	1.4725
24.	82.1357	1179.6	.21783	155.4285	.00685	146.68	235.26	.00080	1.26967	1.2951
26.	80.9895	1186.2	.21145	145.4917	.00721	150.68	207.42	.00078	1.26560	1.1769
28.	79.7998	1187.5	.20598	135.6647	.00761	152.98	186.04	.00076	1.26139	1.0988
30.	78.5637	1187.5	.19997	126.1467	.00798	154.05	169.09	.00074	1.25703	1.0405
32.	77.2941	1189.5	.19415	117.6904	.00832	153.10	155.41	.00072	1.25255	1.0044
34.	75.9926	1186.4	.18882	109.2805	.00869	151.64	144.12	.00070	1.24798	.9798
36.	74.6560	1184.1	.18374	101.6578	.00904	149.83	134.59	.00068	1.24329	.9612
38.	73.2918	1179.1	.17883	94.3467	.00939	147.73	126.45	.00066	1.23852	.9477
40.	71.9051	1173.2	.17439	87.6682	.00972	145.46	119.39	.00064	1.23368	.9362
42.	70.4961	1166.7	.17000	81.4092	.01005	143.02	113.19	.00062	1.22877	.9279
44.	69.0729	1161.9	.16554	75.7670	.01035	140.53	107.70	.00061	1.22383	.9213
46.	67.6380	1160.3	.16033	70.5258	.01063	138.03	102.80	.00060	1.21887	.9188
48.	66.1964	1156.6	.15563	65.6252	.01092	135.55	98.39	.00058	1.21389	.9166
50.	64.7504	1153.5	.15117	61.2150	.01117	133.12	94.41	.00057	1.20891	.9141
55.	61.1430	1147.5	.14107	51.8852	.01170	127.36	85.98	.00056	1.19655	.9061
60.	57.6214	1146.8	.13287	44.9082	.01198	122.36	79.38	.00056	1.18456	.8915
65.	54.2514	1153.3	.12563	39.5450	.01210	118.79	74.26	.00057	1.17316	.8722
70.	51.0762	1170.1	.11904	35.5587	.01201	115.64	70.34	.00058	1.16250	.8548
75.	48.1267	1195.6	.11299	32.5426	.01177	113.07	67.41	.00060	1.15264	.8393
80.	45.4163	1230.7	.10745	30.3250	.01141	110.94	65.28	.00063	1.14364	.8260
90.	40.6944	1322.9	.09758	27.3084	.01052	111.36	62.78	.00071	1.12807	.7844
100.	36.8044	1439.6	.08927	25.4928	.00958	112.41	61.89	.00080	1.11536	.7593
110.	33.5890	1583.6	.08142	24.3021	.00873	116.80	62.84	.00091	1.10492	.7441
120.	30.8955	1731.1	.07569	23.4407	.00800	118.11	62.77	.00099	1.09624	.7364
140.	26.6567	2053.8	.06691	22.3681	.00681	123.44	64.22	.00119	1.08266	.7273
160.	23.4862	2395.9	.06074	21.7295	.00590	130.73	66.84	.00142	1.07258	.7221
180.	21.0273	2745.6	.05630	21.2970	.00519	139.13	70.06	.00167	1.06481	.7180
200.	19.0621	3094.9	.05305	20.9689	.00464	148.09	73.59	.00195	1.05863	.7140
220.	17.4520	3443.1	.05060	20.7219	.00420	157.28	77.28	.00224	1.05359	.7102
240.	16.1070	3782.9	.04874	20.5002	.00384	166.48	81.04	.00256	1.04938	.7064
260.	14.9925	4100.5	.04736	20.2510	.00355	175.57	84.83	.00289	1.04591	.7043
280.	13.9953	4419.3	.04660	20.1147	.00332	184.49	88.62	.00324	1.04281	.7041
300.	13.0969	4764.8	.04579	20.0796	.00308	193.21	92.39	.00362	1.04002	.7016
350.	11.3563	5541.9	.04443	19.8062	.00265	214.12	101.67	.00463	1.03464	.6968
400.	10.0318	6297.0	.04361	19.5952	.00233	233.94	110.71	.00573	1.03056	.6934
450.	8.9880	7039.5	.04307	19.4272	.00208	252.91	119.48	.00693	1.02735	.6910
500.	8.1430	7780.8	.04264	19.2904	.00188	271.26	128.01	.00821	1.02475	.6897
550.	7.4445	8519.7	.04229	19.1769	.00171	289.17	136.31	.00957	1.02261	.6885
600.	6.8570	9261.8	.04198	19.0812	.00158	306.79	144.40	.01103	1.02081	.6876
650.	6.3560	10007.7	.04170	18.9996	.00146	324.21	152.30	.01256	1.01928	.6868
700.	5.9234	10762.8	.04140	18.9292	.00136	341.52	160.03	.01417	1.01796	.6862
750.	5.5462	11526.4	.04110	18.8679	.00127	358.78	167.59	.01587	1.01681	.6856
800.	5.2143	12301.5	.04078	18.8141	.00120	376.03	175.01	.01764	1.01580	.6851
850.	4.9200	13089.6	.04045	18.7664	.00113	393.32	182.29	.01948	1.01490	.6848
900.	4.6572	13892.2	.04010	18.7239	.00107	410.67	189.45	.02139	1.01410	.6846
950.	4.4210	14710.2	.03973	18.6858	.00101	428.10	196.49	.02337	1.01338	.6846
1000.	4.2077	15544.1	.03934	18.6515	.00096	445.63	203.43	.02542	1.01274	.6847
1100.	3.8375	17248.9	.03857	18.5920	.00088	475.56	217.01	.02940	1.01161	.6925
1200.	3.5272	19012.8	.03779	18.5425	.00081	511.00	230.24	.03393	1.01067	.6926
1300.	3.2634	20834.7	.03700	18.5005	.00075	546.89	243.16	.03871	1.00987	.6929
1400.	3.0363	22711.8	.03623	18.4645	.00070	583.17	255.80	.04375	1.00918	.6932
1500.	2.8388	24639.4	.03548	18.4332	.00065	619.77	268.17	.04903	1.00858	.6936
1600.	2.6654	26596.3	.03479	18.4059	.00061	656.25	280.30	.05456	1.00805	.6938
1700.	2.5119	28591.5	.03415	18.3817	.00058	692.93	292.20	.06034	1.00759	.6940
1800.	2.3752	30626.3	.03354	18.3602	.00054	729.96	303.88	.06637	1.00717	.6939
2000.	2.1419	34846.2	.03236	18.3229	.00049	806.67	326.61	.07927	1.00647	.6925
2200.	1.9502	39414.7	.03111	18.2904	.00045	892.56	344.89	.09351	1.00589	.6808
2400.	1.7895	44575.0	.02967	18.2585	.00041	997.36	366.24	.10965	1.00540	.6719
2600.	1.6524	50718.4	.02790	18.2221	.00038	1135.96	387.16	.12852	1.00499	.6563
2800.	1.5334	58357.4	.02579	18.1743	.00035	1327.53	407.79	.15108	1.00463	.6337
3000.	1.4283	68083.8	.02339	18.1067	.00033	1594.22	428.31	.17820	1.00431	.6058

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

19.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 19.118	.01174	2.1888	1.087	234.9	457.9	14.465	5.36	6.78	1664.
20.	.01180	2.1463	1.087	239.9	464.0	14.776	5.48	7.01	1657.
22.	.01194	2.0497	1.083	251.6	478.5	15.470	5.73	7.52	1641.
24.	.01210	1.9535	1.073	264.2	494.1	16.147	5.94	8.01	1623.
26.	.01226	1.8585	1.059	277.6	510.6	16.804	6.12	8.48	1605.
28.	.01244	1.7623	1.044	291.6	528.0	17.449	6.28	8.96	1586.
30.	.01263	1.6739	1.020	306.4	546.3	18.082	6.41	9.38	1565.
32.	.01283	1.5868	.9927	321.7	565.5	18.701	6.53	9.80	1543.
34.	.01304	1.5042	.9637	337.7	585.5	19.307	6.62	10.19	1522.
36.	.01327	1.4243	.9337	354.2	606.3	19.902	6.70	10.58	1499.
38.	.01350	1.3517	.9022	371.3	627.8	20.484	6.77	10.94	1478.
40.	.01375	1.2831	.8695	388.7	650.1	21.053	6.81	11.27	1457.
42.	.01402	1.2175	.8361	406.6	672.9	21.611	6.84	11.58	1436.
44.	.01429	1.1596	.8027	424.8	696.4	22.156	6.87	11.87	1415.
46.	.01458	1.1050	.7694	442.8	719.9	22.678	6.93	12.17	1393.
48.	.01489	1.0534	.7366	461.7	744.5	23.202	6.97	12.45	1372.
50.	.01520	1.0068	.7046	480.8	769.7	23.715	7.01	12.71	1351.
55.	.01606	.9043	.6284	529.5	834.6	24.953	7.06	13.25	1303.
60.	.01699	.8322	.5596	579.1	901.9	26.126	7.05	13.57	1265.
65.	.01799	.7795	.4994	628.4	970.3	27.219	7.04	13.78	1235.
70.	.01906	.7428	.4474	677.4	1039.5	28.246	7.05	13.90	1210.
75.	.02018	.7196	.4027	725.8	1109.2	29.207	7.07	13.95	1192.
80.	.02133	.7070	.3644	773.6	1179.0	30.108	7.11	13.95	1178.
90.	.02373	.7042	.3035	867.4	1318.2	31.748	7.26	13.88	1161.
100.	.02617	.7223	.2584	959.3	1456.4	33.204	7.45	13.78	1156.
110.	.02862	.7504	.2247	1052.0	1595.7	34.530	7.78	13.84	1155.
120.	.03106	.7837	.1986	1143.8	1734.0	35.734	8.04	13.87	1163.
140.	.03593	.8610	.1612	1329.8	2012.4	37.880	8.55	14.01	1188.
160.	.04072	.9459	.1356	1520.0	2293.8	39.757	9.00	14.16	1220.
180.	.04544	1.0322	.1171	1714.6	2578.0	41.431	9.36	14.29	1256.
200.	.05009	1.1192	.1030	1912.9	2864.7	42.942	9.64	14.40	1293.
220.	.05468	1.2060	.0920	2114.4	3153.3	44.317	9.87	14.48	1330.
240.	.05922	1.2915	.0831	2318.2	3443.3	45.579	10.03	14.54	1368.
260.	.06371	1.3766	.0759	2523.7	3734.2	46.744	10.15	14.57	1405.
280.	.06809	1.4543	.0701	2730.3	4024.0	47.817	10.24	14.63	1441.
300.	.07275	1.5513	.0653	2941.0	4323.3	48.842	10.32	14.59	1486.
350.	.08384	1.7620	.0554	3464.7	5057.8	51.107	10.40	14.58	1577.
400.	.09486	1.9711	.0481	3989.1	5791.5	53.067	10.43	14.66	1665.
450.	.10583	2.1791	.0426	4513.1	6524.0	54.792	10.43	14.63	1748.
500.	.11677	2.3865	.0382	5036.6	7255.3	56.332	10.44	14.62	1828.
550.	.12769	2.5934	.0347	5559.7	7985.8	57.725	10.44	14.61	1905.
600.	.13859	2.8000	.0318	6083.2	8716.5	58.993	10.45	14.61	1978.
650.	.14949	3.0065	.0293	6606.9	9447.2	60.160	10.48	14.62	2049.
700.	.16037	3.2128	.0272	7132.0	10179.0	61.251	10.50	14.65	2116.
750.	.17125	3.4190	.0254	7658.6	10912.4	62.265	10.54	14.68	2182.
800.	.18212	3.6251	.0238	8187.2	11647.5	63.214	10.59	14.72	2245.
850.	.19299	3.8312	.0224	8718.3	12385.2	64.108	10.65	14.78	2306.
900.	.20386	4.0373	.0211	9252.4	13125.8	64.953	10.71	14.84	2365.
950.	.21472	4.2433	.0200	9789.9	13869.6	65.756	10.79	14.92	2422.
1000.	.22559	4.4494	.0190	10331.0	14617.1	66.522	10.87	15.00	2477.
1100.	.24731	4.8614	.0173	11427.5	16126.3	67.950	11.05	15.18	2584.
1200.	.26902	5.2735	.0158	12543.1	17654.6	69.272	11.25	15.37	2684.
1300.	.29074	5.6855	.0146	13679.4	19203.4	70.511	11.46	15.58	2780.
1400.	.31245	6.0976	.0136	14836.9	20773.5	71.682	11.68	15.80	2872.
1500.	.33416	6.5097	.0127	16016.1	22365.2	72.794	11.91	16.03	2960.
1600.	.35587	6.9218	.0119	17216.1	23977.6	73.828	12.12	16.24	3045.
1700.	.37758	7.3340	.0112	18437.5	25611.6	74.814	12.34	16.46	3128.
1800.	.39929	7.7461	.0105	19680.6	27267.2	75.759	12.55	16.67	3208.
2000.	.44273	8.5705	.0095	22232.7	30644.5	77.549	12.97	17.10	3361.
2200.	.48622	9.3949	.0086	24871.2	34109.4	79.192	13.47	17.61	3505.
2400.	.52984	10.2194	.0079	27623.0	37690.0	80.744	14.10	18.28	3639.
2600.	.57376	11.0439	.0073	30529.6	41431.0	82.241	14.97	19.22	3765.
2800.	.61822	11.8684	.0068	33655.1	45401.3	83.717	16.19	20.56	3882.
3000.	.66362	12.6930	.0063	37086.2	49695.0	85.206	17.86	22.44	3992.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

19.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 19.118	85.2101	1163.2	.23808	186.5051	.00583	128.28	371.53	.00080	1.28062	1.9632
20.	84.7679	1174.0	.23391	181.9341	.00597	132.54	339.20	.00080	1.27904	1.7948
22.	83.7332	1192.9	.22562	171.6289	.00631	141.99	283.35	.00081	1.27535	1.5016
24.	82.6557	1205.6	.21851	161.4700	.00664	148.43	243.78	.00081	1.27152	1.3157
26.	81.5368	1213.5	.21218	151.5387	.00699	152.60	214.52	.00079	1.26754	1.1917
28.	80.3756	1215.5	.20686	141.6440	.00737	155.04	192.11	.00078	1.26343	1.1100
30.	79.1733	1219.4	.20094	132.5251	.00770	156.24	174.44	.00076	1.25918	1.0477
32.	77.9378	1220.5	.19519	123.6705	.00803	155.38	160.20	.00073	1.25482	1.0102
34.	76.6717	1219.9	.18980	115.3272	.00836	154.01	148.48	.00071	1.25036	.9828
36.	75.3732	1216.7	.18479	107.3503	.00870	152.27	138.63	.00069	1.24580	.9635
38.	74.0500	1213.9	.18000	100.0933	.00901	150.25	130.23	.00067	1.24117	.9484
40.	72.7052	1208.9	.17564	93.2885	.00932	148.04	122.97	.00065	1.23647	.9359
42.	71.3391	1202.8	.17135	86.8536	.00963	145.65	116.61	.00063	1.23171	.9270
44.	69.9599	1199.3	.16698	81.1246	.00989	143.21	110.98	.00062	1.22691	.9196
46.	68.5701	1198.8	.16187	75.7725	.01015	140.75	105.97	.00061	1.22209	.9165
48.	67.1744	1196.2	.15726	70.7616	.01041	138.32	101.47	.00060	1.21726	.9136
50.	65.7751	1194.2	.15288	66.2248	.01064	135.92	97.41	.00059	1.21244	.9105
55.	62.2843	1187.5	.14293	56.3238	.01116	130.22	88.81	.00057	1.20045	.9036
60.	58.8641	1187.7	.13482	48.9852	.01142	125.23	82.03	.00056	1.18878	.8888
65.	55.5777	1195.0	.12759	43.3246	.01153	121.65	76.73	.00057	1.17764	.8689
70.	52.4673	1210.8	.12100	38.9727	.01148	118.35	72.62	.00058	1.16716	.8529
75.	49.5605	1235.5	.11492	35.6623	.01129	115.79	69.50	.00060	1.15743	.8373
80.	46.8716	1268.7	.10931	33.1362	.01100	113.56	67.18	.00063	1.14847	.8252
90.	42.1486	1357.6	.09924	29.6812	.01022	113.82	64.36	.00070	1.13285	.7848
100.	38.2186	1472.5	.09070	27.6063	.00936	114.70	63.21	.00078	1.11997	.7596
110.	34.9461	1615.2	.08265	26.2242	.00857	119.16	64.05	.00089	1.10932	.7438
120.	32.1917	1761.7	.07674	25.2298	.00787	120.24	63.85	.00097	1.10041	.7365
140.	27.8335	2082.2	.06774	23.9651	.00673	125.25	65.08	.00116	1.08642	.7279
160.	24.5555	2424.1	.06141	23.2266	.00584	132.27	67.54	.00137	1.07597	.7228
180.	22.0052	2773.2	.05685	22.7145	.00515	140.41	70.63	.00161	1.06790	.7190
200.	19.9632	3123.6	.05351	22.3426	.00461	149.16	74.07	.00187	1.06146	.7151
220.	18.2878	3472.3	.05098	22.0555	.00417	158.17	77.69	.00215	1.05620	.7113
240.	16.8866	3813.5	.04907	21.8084	.00381	167.23	81.40	.00245	1.05182	.7076
260.	15.6958	4148.7	.04760	21.6068	.00351	176.21	85.14	.00277	1.04810	.7039
280.	14.6869	4475.8	.04663	21.3591	.00328	185.03	88.83	.00310	1.04496	.7029
300.	13.7453	4793.8	.04606	21.3231	.00306	193.68	92.63	.00345	1.04204	.7024
350.	11.9268	5571.4	.04466	21.0151	.00264	214.46	101.86	.00441	1.03640	.6975
400.	10.5415	6326.7	.04381	20.7781	.00232	234.20	110.86	.00546	1.03213	.6940
450.	9.4487	7069.4	.04324	20.5898	.00207	253.11	119.61	.00659	1.02876	.6915
500.	8.5636	7810.8	.04279	20.4367	.00187	271.43	128.12	.00781	1.02604	.6900
550.	7.8313	8549.7	.04243	20.3098	.00171	289.31	136.41	.00910	1.02380	.6888
600.	7.2153	9291.9	.04211	20.2029	.00157	306.91	144.49	.01048	1.02191	.6879
650.	6.6895	10037.8	.04181	20.1118	.00146	324.31	152.38	.01194	1.02030	.6870
700.	6.2355	10793.0	.04150	20.0333	.00136	341.61	160.09	.01347	1.01891	.6863
750.	5.8395	11556.7	.04119	19.9649	.00127	358.86	167.65	.01507	1.01771	.6857
800.	5.4908	12331.9	.04087	19.9048	.00119	376.11	175.06	.01675	1.01664	.6852
850.	5.1816	13120.1	.04053	19.8517	.00113	393.39	182.34	.01850	1.01570	.6849
900.	4.9054	13922.8	.04017	19.8043	.00107	410.73	189.49	.02031	1.01486	.6847
950.	4.6572	14740.9	.03980	19.7619	.00101	428.16	196.53	.02219	1.01410	.6847
1000.	4.4329	15574.9	.03941	19.7236	.00096	445.68	203.47	.02413	1.01342	.6847
1100.	4.0436	17280.0	.03863	19.6575	.00088	475.56	217.04	.02790	1.01224	.6926
1200.	3.7171	19044.3	.03784	19.6023	.00081	511.00	230.27	.03219	1.01124	.6927
1300.	3.4395	20866.6	.03705	19.5556	.00075	546.89	243.19	.03673	1.01040	.6930
1400.	3.2005	22744.1	.03627	19.5155	.00069	583.17	255.82	.04151	1.00968	.6933
1500.	2.9926	24672.1	.03552	19.4808	.00065	619.77	268.19	.04651	1.00905	.6936
1600.	2.8100	26629.2	.03483	19.4504	.00061	656.25	280.32	.05175	1.00849	.6939
1700.	2.6484	28624.4	.03418	19.4236	.00057	692.91	292.22	.05723	1.00800	.6941
1800.	2.5044	30659.0	.03357	19.3996	.00054	729.91	303.90	.06295	1.00757	.6940
2000.	2.2587	34875.8	.03239	19.3583	.00049	806.48	326.63	.07516	1.00682	.6926
2200.	2.0567	39434.4	.03115	19.3224	.00045	891.96	344.89	.08865	1.00621	.6810
2400.	1.8874	44570.6	.02972	19.2876	.00041	995.82	366.24	.10390	1.00570	.6723
2600.	1.7429	50665.3	.02798	19.2484	.00038	1132.54	387.15	.12170	1.00526	.6571
2800.	1.6175	58217.4	.02589	19.1977	.00035	1320.80	407.77	.14294	1.00488	.6349
3000.	1.5069	67804.1	.02352	19.1270	.00033	1582.18	429.28	.16846	1.00455	.6074

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

20.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 19.360	.01169	2.2344	1.094	236.2	470.0	14.482	5.38	6.80	1680.
20.	.01173	2.2040	1.094	239.7	474.4	14.706	5.47	6.97	1675.
22.	.01187	2.1087	1.090	251.3	488.8	15.396	5.72	7.47	1659.
24.	.01203	2.0136	1.082	263.7	504.2	16.068	5.93	7.95	1642.
26.	.01219	1.9195	1.068	276.9	520.6	16.720	6.11	8.41	1625.
28.	.01236	1.8274	1.051	290.8	537.9	17.359	6.28	8.86	1606.
30.	.01254	1.7369	1.032	305.3	556.1	17.987	6.41	9.30	1588.
32.	.01273	1.6480	1.006	320.5	575.1	18.600	6.53	9.71	1566.
34.	.01293	1.5685	.9777	336.2	594.9	19.201	6.63	10.09	1546.
36.	.01315	1.4861	.9483	352.5	615.4	19.789	6.71	10.48	1523.
38.	.01337	1.4146	.9177	369.3	636.8	20.365	6.78	10.82	1503.
40.	.01361	1.3444	.8859	386.5	658.7	20.928	6.82	11.15	1482.
42.	.01386	1.2803	.8533	404.1	681.3	21.479	6.85	11.44	1462.
44.	.01412	1.2210	.8206	422.0	704.5	22.018	6.89	11.73	1442.
46.	.01440	1.1649	.7880	439.8	727.7	22.534	6.95	12.03	1420.
48.	.01468	1.1145	.7558	458.4	752.1	23.051	6.99	12.30	1400.
50.	.01498	1.0671	.7242	477.2	776.9	23.558	7.03	12.54	1380.
55.	.01578	.9631	.6489	525.3	841.0	24.780	7.08	13.07	1333.
60.	.01666	.8863	.5803	574.3	907.5	25.938	7.07	13.40	1296.
65.	.01760	.8298	.5197	623.1	975.1	27.018	7.07	13.62	1265.
70.	.01860	.7893	.4671	671.6	1043.6	28.034	7.07	13.76	1239.
75.	.01964	.7626	.4216	719.7	1112.6	28.987	7.09	13.84	1220.
80.	.02073	.7461	.3823	767.3	1181.9	29.881	7.13	13.87	1204.
90.	.02297	.7396	.3195	860.9	1320.3	31.513	7.28	13.83	1186.
100.	.02527	.7532	.2725	953.0	1458.3	32.966	7.48	13.77	1178.
110.	.02758	.7787	.2370	1045.9	1597.6	34.292	7.80	13.83	1175.
120.	.02990	.8101	.2096	1138.0	1735.9	35.496	8.06	13.88	1181.
140.	.03451	.8842	.1702	1324.5	2014.7	37.645	8.57	14.03	1203.
160.	.03906	.9669	.1432	1515.4	2296.6	39.525	9.01	14.19	1234.
180.	.04355	1.0521	.1235	1710.5	2581.4	41.203	9.37	14.32	1268.
200.	.04796	1.1390	.1087	1909.4	2868.7	42.717	9.66	14.43	1304.
220.	.05233	1.2245	.0970	2111.4	3157.9	44.095	9.88	14.51	1341.
240.	.05664	1.3105	.0876	2315.6	3448.5	45.359	10.05	14.56	1378.
260.	.06091	1.3950	.0800	2521.6	3739.8	46.526	10.17	14.59	1415.
280.	.06514	1.4793	.0735	2728.6	4031.5	47.606	10.26	14.60	1451.
300.	.06951	1.5696	.0688	2939.0	4329.2	48.624	10.33	14.70	1495.
350.	.08005	1.7800	.0583	3463.2	5064.3	50.892	10.41	14.69	1585.
400.	.09053	1.9889	.0507	3987.9	5798.4	52.852	10.43	14.67	1672.
450.	.10095	2.1968	.0449	4512.2	6531.3	54.578	10.44	14.64	1755.
500.	.11135	2.4040	.0403	5035.9	7262.8	56.119	10.44	14.62	1835.
550.	.12172	2.6108	.0365	5559.1	7993.5	57.512	10.45	14.61	1911.
600.	.13208	2.8173	.0334	6082.8	8724.3	58.781	10.46	14.61	1984.
650.	.14243	3.0237	.0308	6606.6	9455.1	59.948	10.48	14.62	2054.
700.	.15277	3.2299	.0286	7131.7	10187.0	61.039	10.51	14.65	2122.
750.	.16310	3.4360	.0267	7658.5	10920.5	62.053	10.54	14.68	2187.
800.	.17343	3.6420	.0250	8187.1	11655.7	63.002	10.59	14.72	2250.
850.	.18376	3.8481	.0235	8718.3	12393.4	63.896	10.65	14.78	2311.
900.	.19408	4.0541	.0222	9252.5	13134.0	64.741	10.71	14.84	2370.
950.	.20440	4.2601	.0210	9789.9	13877.9	65.544	10.79	14.92	2427.
1000.	.21472	4.4660	.0200	10331.0	14625.4	66.310	10.87	15.00	2482.
1100.	.23535	4.8780	.0182	11427.6	16134.7	67.738	11.05	15.18	2588.
1200.	.25599	5.2899	.0167	12543.3	17663.0	69.060	11.25	15.37	2689.
1300.	.27661	5.7019	.0154	13679.6	19211.8	70.299	11.46	15.58	2784.
1400.	.29724	6.1139	.0143	14837.2	20782.0	71.470	11.68	15.80	2876.
1500.	.31786	6.5260	.0133	16016.4	22373.7	72.582	11.91	16.03	2964.
1600.	.33849	6.9380	.0125	17216.3	23986.1	73.616	12.12	16.24	3049.
1700.	.35911	7.3501	.0118	18437.8	25620.1	74.602	12.34	16.46	3131.
1800.	.37974	7.7622	.0111	19680.9	27275.7	75.547	12.55	16.67	3211.
2000.	.42100	8.5865	.0100	22232.7	30652.7	77.337	12.97	17.10	3364.
2200.	.46231	9.4108	.0091	24870.5	34116.7	78.980	13.46	17.51	3508.
2400.	.50375	10.2352	.0083	27620.2	37695.2	80.531	14.09	18.27	3642.
2600.	.54546	11.0597	.0077	30522.3	41431.5	82.026	14.95	19.19	3768.
2800.	.58767	11.8842	.0071	33639.2	45392.7	83.498	16.14	20.50	3885.
3000.	.63076	12.7087	.0067	37055.1	49670.3	84.983	17.77	22.33	3996.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

20.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 19.360	85.5433	1188.4	.23748	191.1415	.00572	130.47	377.62	.00081	1.28181	1.9680
20.	85.2277	1196.5	.23452	187.8410	.00582	133.83	353.32	.00081	1.28068	1.8393
22.	84.2142	1216.9	.22624	177.5827	.00614	143.51	294.22	.00082	1.27706	1.5319
24.	83.1599	1231.0	.21916	167.4527	.00646	150.14	252.50	.00082	1.27331	1.3371
26.	82.0662	1240.2	.21286	157.5289	.00678	154.47	221.76	.00081	1.26942	1.2073
28.	80.9346	1246.8	.20687	147.8964	.00710	157.06	198.32	.00079	1.26541	1.1185
30.	79.7603	1248.6	.20186	138.5345	.00745	158.37	179.85	.00077	1.26125	1.0564
32.	78.5555	1249.8	.19620	129.4586	.00777	157.60	165.02	.00074	1.25700	1.0170
34.	77.3220	1251.9	.19082	121.2815	.00806	156.30	152.86	.00072	1.25265	.9869
36.	76.0619	1248.7	.18579	113.0376	.00839	154.65	142.68	.00070	1.24822	.9665
38.	74.7739	1247.5	.18109	105.7719	.00868	152.69	134.00	.00068	1.24370	.9499
40.	73.4653	1242.7	.17682	98.7645	.00897	150.53	126.52	.00066	1.23912	.9368
42.	72.1398	1238.5	.17261	92.3572	.00924	148.20	119.99	.00065	1.23450	.9265
44.	70.8011	1235.4	.16832	86.4488	.00949	145.80	114.23	.00063	1.22984	.9187
46.	69.4518	1235.3	.16330	80.9077	.00974	143.38	109.10	.00062	1.22515	.9154
48.	68.0970	1234.8	.15876	75.8970	.00996	140.98	104.50	.00061	1.22045	.9114
50.	66.7399	1233.4	.15447	71.2198	.01017	138.61	100.35	.00060	1.21576	.9081
55.	63.3544	1229.0	.14469	61.0163	.01064	132.96	91.58	.00058	1.20412	.9003
60.	60.0282	1228.7	.13665	53.2057	.01091	127.99	84.63	.00057	1.19274	.8861
65.	56.8213	1235.5	.12944	47.1485	.01102	124.39	79.15	.00058	1.18185	.8666
70.	53.7734	1250.6	.12286	42.4454	.01100	121.20	74.87	.00059	1.17155	.8502
75.	50.9103	1274.2	.11675	38.8224	.01086	118.42	71.57	.00061	1.16194	.8363
80.	48.2479	1305.7	.11107	36.0001	.01062	116.11	69.08	.00062	1.15305	.8250
90.	43.5352	1393.9	.10084	32.2001	.00992	116.24	65.95	.00070	1.13742	.7846
100.	39.5742	1506.3	.09212	29.8080	.00914	116.95	64.54	.00077	1.12440	.7599
110.	36.2537	1647.9	.08384	28.2319	.00840	121.46	65.24	.00087	1.11357	.7431
120.	33.4477	1793.6	.07778	27.0964	.00774	122.33	64.92	.00095	1.10447	.7364
140.	28.9793	2112.2	.06855	25.6237	.00664	127.06	65.94	.00113	1.09008	.7281
160.	25.6015	2452.6	.06207	24.7531	.00578	133.82	68.24	.00133	1.07930	.7234
180.	22.9647	2801.5	.05739	24.1615	.00511	141.71	71.21	.00155	1.07093	.7197
200.	20.8486	3153.1	.05396	23.7458	.00458	150.25	74.56	.00180	1.06425	.7160
220.	19.1108	3500.9	.05136	23.4010	.00415	159.09	78.10	.00207	1.05878	.7125
240.	17.6549	3844.4	.04940	23.1363	.00379	168.00	81.76	.00235	1.05422	.7087
260.	16.4175	4179.8	.04788	22.9019	.00349	176.86	85.46	.00266	1.05035	.7051
280.	15.3509	4508.9	.04669	22.7079	.00324	185.59	89.17	.00298	1.04703	.7014
300.	14.3862	4823.0	.04633	22.5803	.00305	194.16	92.89	.00331	1.04403	.7033
350.	12.4914	5600.9	.04488	22.2353	.00262	214.81	102.06	.00421	1.03815	.6982
400.	11.0465	6356.5	.04400	21.9708	.00231	234.46	111.02	.00521	1.03368	.6945
450.	9.9058	7099.3	.04341	21.7611	.00206	253.32	119.74	.00629	1.03017	.6919
500.	8.9811	7840.9	.04294	21.5907	.00186	271.60	128.23	.00745	1.02732	.6904
550.	8.2157	8579.8	.04256	21.4496	.00170	289.46	136.50	.00868	1.02497	.6891
600.	7.5713	9322.1	.04223	21.3309	.00157	307.03	144.57	.00999	1.02300	.6881
650.	7.0212	10068.0	.04192	21.2298	.00145	324.42	152.45	.01137	1.02132	.6872
700.	6.5460	10823.3	.04160	21.1426	.00135	341.71	160.16	.01283	1.01986	.6865
750.	6.1312	11587.0	.04129	21.0668	.00127	358.95	167.71	.01436	1.01860	.6859
800.	5.7660	12362.2	.04096	21.0002	.00119	376.19	175.11	.01595	1.01748	.6854
850.	5.4420	13150.6	.04061	20.9412	.00112	393.46	182.39	.01761	1.01649	.6850
900.	5.1525	13953.4	.04025	20.8888	.00106	410.80	189.54	.01934	1.01561	.6848
950.	4.8924	14771.6	.03987	20.8418	.00101	428.22	196.57	.02112	1.01482	.6847
1000.	4.6572	15605.7	.03948	20.7994	.00096	445.73	203.50	.02297	1.01410	.6848
1100.	4.2489	17311.1	.03869	20.7262	.00088	475.56	217.08	.02655	1.01286	.6927
1200.	3.9065	19075.7	.03789	20.6651	.00081	511.00	230.30	.03063	1.01182	.6928
1300.	3.6152	20898.4	.03710	20.6134	.00075	546.89	243.21	.03495	1.01093	.6931
1400.	3.3643	22776.3	.03631	20.5690	.00069	583.17	255.84	.03948	1.01017	.6934
1500.	3.1460	24704.6	.03556	20.5306	.00065	619.77	268.21	.04424	1.00951	.6937
1600.	2.9543	26662.0	.03487	20.4971	.00061	656.24	280.34	.04923	1.00893	.6940
1700.	2.7846	28657.3	.03422	20.4674	.00057	692.89	292.24	.05443	1.00842	.6941
1800.	2.6334	30691.6	.03360	20.4409	.00054	729.87	303.91	.05986	1.00796	.6940
2000.	2.3753	34905.7	.03243	20.3953	.00049	806.30	326.64	.07147	1.00717	.6927
2200.	2.1630	39455.2	.03119	20.3559	.00045	891.41	344.89	.08427	1.00653	.6812
2400.	1.9851	44569.2	.02977	20.3180	.00041	994.40	366.23	.09873	1.00599	.6727
2600.	1.8333	50618.9	.02805	20.2759	.00038	1129.38	387.15	.11557	1.00553	.6578
2800.	1.7016	58090.9	.02599	20.2224	.00035	1314.58	407.76	.13564	1.00514	.6360
3000.	1.5854	67548.4	.02365	20.1484	.00033	1571.05	428.25	.15972	1.00478	.6088

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

22.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 19.835	.01160	2.3243	1.107	238.7	493.9	14.516	5.43	6.84	1711.
20.	.01161	2.3167	1.107	239.6	495.1	14.574	5.45	6.88	1710.
22.	.01175	2.2238	1.105	250.9	509.3	15.255	5.71	7.37	1695.
24.	.01189	2.1308	1.098	263.0	524.6	15.917	5.92	7.84	1680.
26.	.01204	2.0385	1.086	275.9	540.7	16.561	6.11	8.29	1663.
28.	.01220	1.9476	1.070	289.4	557.7	17.190	6.27	8.72	1646.
30.	.01236	1.8591	1.051	303.5	575.5	17.806	6.41	9.14	1628.
32.	.01254	1.7748	1.031	318.3	594.3	18.411	6.53	9.55	1611.
34.	.01273	1.6912	1.004	333.7	613.7	19.001	6.63	9.92	1590.
36.	.01293	1.6150	.9760	349.5	633.9	19.578	6.72	10.27	1571.
38.	.01314	1.5350	.9468	365.8	654.8	20.143	6.79	10.62	1549.
40.	.01335	1.4676	.9167	382.6	676.4	20.695	6.84	10.92	1531.
42.	.01358	1.4030	.8856	399.7	698.5	21.235	6.88	11.21	1512.
44.	.01382	1.3406	.8542	417.2	721.2	21.763	6.91	11.49	1492.
46.	.01407	1.2848	.8227	434.4	743.9	22.267	6.98	11.77	1472.
48.	.01433	1.2332	.7915	452.6	767.7	22.774	7.02	12.03	1453.
50.	.01459	1.1839	.7609	470.9	792.0	23.270	7.06	12.27	1434.
55.	.01531	1.0785	.6875	517.8	854.7	24.463	7.12	12.77	1391.
60.	.01609	.9927	.6193	565.7	919.7	25.596	7.12	13.12	1353.
65.	.01692	.9299	.5583	613.6	985.8	26.653	7.11	13.35	1321.
70.	.01780	.8831	.5046	661.3	1053.0	27.649	7.11	13.51	1295.
75.	.01873	.8498	.4577	708.8	1120.8	28.585	7.14	13.62	1274.
80.	.01969	.8291	.4170	756.0	1189.1	29.467	7.18	13.68	1257.
90.	.02168	.8110	.3506	849.2	1326.2	31.083	7.32	13.73	1234.
100.	.02374	.8163	.3002	941.3	1463.6	32.529	7.52	13.74	1222.
110.	.02582	.8367	.2616	1034.6	1602.6	33.853	7.83	13.83	1215.
120.	.02790	.8643	.2314	1127.1	1741.0	35.057	8.09	13.88	1218.
140.	.03207	.9309	.1880	1314.6	2020.1	37.208	8.60	14.07	1234.
160.	.03620	1.0099	.1582	1506.5	2302.8	39.095	9.04	14.24	1261.
180.	.04028	1.0936	.1365	1702.7	2588.7	40.779	9.40	14.38	1293.
200.	.04430	1.1784	.1200	1902.6	2877.1	42.298	9.69	14.48	1327.
220.	.04827	1.2638	.1071	2105.5	3167.4	43.681	9.91	14.56	1362.
240.	.05219	1.3483	.0966	2310.7	3459.0	44.950	10.08	14.61	1398.
260.	.05608	1.4326	.0881	2517.5	3751.2	46.120	10.20	14.64	1433.
280.	.05993	1.5155	.0810	2725.4	4043.8	47.204	10.29	14.64	1468.
300.	.06392	1.6065	.0758	2935.1	4341.2	48.220	10.34	14.73	1513.
350.	.07351	1.8164	.0642	3460.2	5077.5	50.491	10.42	14.71	1602.
400.	.08303	2.0248	.0558	3985.7	5812.4	52.454	10.44	14.68	1687.
450.	.09252	2.2323	.0494	4510.5	6545.9	54.181	10.44	14.65	1770.
500.	.10197	2.4392	.0443	5034.6	7277.9	55.723	10.45	14.63	1848.
550.	.11140	2.6457	.0402	5558.1	8009.0	57.117	10.45	14.62	1924.
600.	.12082	2.8520	.0368	6082.0	8740.0	58.386	10.46	14.62	1996.
650.	.13023	3.0581	.0339	6606.1	9471.1	59.553	10.48	14.63	2066.
700.	.13963	3.2641	.0315	7131.4	10203.2	60.645	10.51	14.65	2133.
750.	.14902	3.4700	.0294	7658.3	10936.7	61.659	10.55	14.68	2198.
800.	.15841	3.6759	.0275	8187.0	11672.1	62.608	10.59	14.73	2260.
850.	.16780	3.8817	.0259	8718.3	12409.9	63.502	10.65	14.78	2321.
900.	.17718	4.0875	.0244	9252.5	13150.6	64.348	10.72	14.84	2379.
950.	.18657	4.2934	.0231	9790.1	13894.5	65.151	10.79	14.92	2436.
1000.	.19595	4.4993	.0220	10331.3	14642.1	65.917	10.88	15.00	2491.
1100.	.21471	4.9110	.0200	11427.9	16151.5	67.345	11.05	15.18	2597.
1200.	.23346	5.3227	.0183	12543.8	17679.9	68.667	11.25	15.37	2697.
1300.	.25221	5.7345	.0169	13680.1	19228.7	69.906	11.45	15.58	2792.
1400.	.27096	6.1463	.0157	14837.7	20798.9	71.077	11.68	15.80	2883.
1500.	.28971	6.5582	.0146	16017.0	22390.7	72.189	11.91	16.03	2971.
1600.	.30846	6.9702	.0137	17217.0	24003.1	73.223	12.12	16.24	3056.
1700.	.32721	7.3821	.0129	18438.5	25637.1	74.209	12.34	16.46	3138.
1800.	.34596	7.7941	.0122	19681.5	27292.6	75.154	12.55	16.67	3218.
2000.	.38347	8.6182	.0110	22232.9	30669.2	76.943	12.97	17.10	3370.
2200.	.42102	9.4424	.0100	24869.3	34131.7	78.586	13.45	17.59	3514.
2400.	.45868	10.2667	.0092	27615.3	37706.3	80.135	14.05	18.24	3648.
2600.	.49658	11.0910	.0085	30509.4	41434.2	81.627	14.89	19.13	3774.
2800.	.53492	11.9154	.0079	33610.7	45378.9	83.093	16.04	20.40	3892.
3000.	.57401	12.7398	.0073	36999.6	49627.8	84.567	17.60	22.15	4003.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

22.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)/V_P$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 19.835	86.1915	1237.7	.23646	200.3367	.00553	135.33	389.82	.00083	1.28412	1.9700
20.	86.1126	1240.0	.23571	199.4935	.00555	136.34	383.11	.00083	1.28384	1.9336
22.	85.1375	1263.3	.22745	189.3277	.00584	146.47	316.97	.00084	1.28036	1.5960
24.	84.1251	1280.1	.22039	179.2570	.00613	153.47	270.62	.00084	1.27675	1.3827
26.	83.0769	1291.9	.21414	169.3539	.00641	158.10	236.71	.00083	1.27301	1.2405
28.	81.9943	1300.9	.20822	159.6962	.00670	160.95	211.00	.00081	1.26917	1.1432
30.	80.8791	1306.6	.20282	150.3656	.00699	162.51	190.94	.00079	1.26521	1.0734
32.	79.7230	1310.1	.19800	141.4922	.00729	161.88	174.79	.00077	1.26112	1.0307
34.	78.5491	1312.0	.19279	132.8393	.00756	160.73	161.68	.00074	1.25697	.9979
36.	77.3507	1314.5	.18774	124.9214	.00781	159.21	150.76	.00072	1.25275	.9725
38.	76.1310	1310.9	.18310	116.8606	.00810	157.37	141.53	.00070	1.24846	.9552
40.	74.8894	1309.6	.17898	109.9089	.00834	155.31	133.59	.00068	1.24411	.9394
42.	73.6316	1307.3	.17492	103.3082	.00857	153.07	126.68	.00067	1.23970	.9275
44.	72.3632	1304.4	.17076	97.0078	.00881	150.75	120.62	.00065	1.23528	.9190
46.	71.0858	1307.0	.16586	91.3284	.00901	148.39	115.24	.00064	1.23083	.9143
48.	69.8029	1308.1	.16146	86.0786	.00920	146.04	110.43	.00063	1.22637	.9095
50.	68.5179	1307.9	.15731	81.1197	.00938	143.72	106.10	.00062	1.22191	.9056
55.	65.3150	1308.2	.14788	70.4407	.00976	138.15	96.96	.00060	1.21085	.8961
60.	62.1590	1306.9	.14000	61.7071	.01004	133.20	89.70	.00059	1.20002	.8833
65.	59.0971	1313.9	.13286	54.9559	.01016	129.59	83.90	.00059	1.18957	.8642
70.	56.1677	1328.3	.12626	49.6016	.01017	126.33	79.30	.00060	1.17964	.8481
75.	53.3927	1350.4	.12012	45.3741	.01009	123.43	75.67	.00061	1.17027	.8352
80.	50.7897	1381.7	.11438	42.1081	.00990	120.97	72.86	.00063	1.16154	.8241
90.	46.1163	1465.0	.10388	37.3989	.00937	120.88	69.13	.00069	1.14596	.7855
100.	42.1248	1573.5	.09484	34.3878	.00873	121.33	67.23	.00075	1.13277	.7612
110.	38.7330	1713.5	.08620	32.4091	.00807	125.91	67.55	.00085	1.12165	.7419
120.	35.8380	1857.7	.07982	30.9735	.00747	126.39	67.01	.00091	1.11222	.7360
140.	31.1839	2171.6	.07012	29.0286	.00648	130.65	67.66	.00107	1.09716	.7284
160.	27.6265	2510.4	.06335	27.8988	.00567	136.95	69.65	.00125	1.08575	.7241
180.	24.8290	2860.2	.05845	27.1517	.00503	144.38	72.39	.00146	1.07684	.7208
200.	22.5752	3211.3	.05485	26.6016	.00451	152.50	75.56	.00168	1.06970	.7176
220.	20.7183	3561.8	.05211	26.1833	.00409	160.98	78.96	.00192	1.06384	.7143
240.	19.1592	3905.8	.05003	25.8330	.00374	169.60	82.50	.00218	1.05894	.7107
260.	17.8323	4243.2	.04842	25.5464	.00345	178.22	86.11	.00246	1.05478	.7072
280.	16.6866	4572.0	.04717	25.2890	.00320	186.76	89.75	.00275	1.05119	.7037
300.	15.6457	4882.0	.04687	25.1355	.00302	195.17	93.40	.00305	1.04795	.7048
350.	13.6037	5660.4	.04532	24.7099	.00260	215.54	102.46	.00388	1.04160	.6995
400.	12.0431	6416.4	.04438	24.3855	.00229	235.02	111.34	.00478	1.03676	.6956
450.	10.8089	7159.4	.04374	24.1293	.00205	253.76	120.01	.00577	1.03295	.6928
500.	9.8070	7901.1	.04323	23.9216	.00185	271.95	128.46	.00682	1.02986	.6911
550.	8.9766	8640.2	.04283	23.7498	.00169	289.75	136.70	.00795	1.02731	.6897
600.	8.2769	9382.5	.04246	23.6056	.00156	307.28	144.74	.00914	1.02516	.6886
650.	7.6789	10128.5	.04214	23.4828	.00144	324.64	152.60	.01040	1.02333	.6876
700.	7.1619	10883.8	.04180	23.3771	.00135	341.90	160.29	.01173	1.02175	.6869
750.	6.7104	11647.6	.04147	23.2851	.00126	359.12	167.83	.01312	1.02037	.6862
800.	6.3126	12423.0	.04113	23.2044	.00119	376.34	175.22	.01457	1.01915	.6856
850.	5.9595	13211.5	.04077	23.1331	.00112	393.60	182.49	.01609	1.01807	.6852
900.	5.6438	14014.5	.04040	23.0696	.00106	410.93	189.63	.01766	1.01711	.6850
950.	5.3600	14832.9	.04001	23.0127	.00101	428.34	196.66	.01929	1.01624	.6849
1000.	5.1034	15667.3	.03961	22.9615	.00096	445.84	203.58	.02097	1.01546	.6849
1100.	4.6575	17373.3	.03881	22.8730	.00087	475.56	217.15	.02422	1.01410	.6930
1200.	4.2834	19138.5	.03800	22.7992	.00080	511.00	230.36	.02794	1.01297	.6930
1300.	3.9649	20961.3	.03719	22.7368	.00074	546.89	243.27	.03186	1.01200	.6932
1400.	3.6905	22840.5	.03640	22.6834	.00069	583.16	255.89	.03599	1.01116	.6935
1500.	3.4517	24769.5	.03564	22.6371	.00065	619.76	268.26	.04032	1.01044	.6938
1600.	3.2419	26727.4	.03494	22.5966	.00061	656.22	280.38	.04486	1.00980	.6941
1700.	3.0562	28722.9	.03429	22.5609	.00057	692.86	292.27	.04959	1.00924	.6942
1800.	2.8905	30756.8	.03367	22.5290	.00054	729.79	303.95	.05453	1.00874	.6942
2000.	2.6078	34966.1	.03249	22.4743	.00049	805.98	326.67	.06508	1.00788	.6929
2200.	2.3752	39499.4	.03126	22.4273	.00045	890.42	344.89	.07671	1.00717	.6815
2400.	2.1802	44573.9	.02987	22.3829	.00041	991.85	366.23	.08981	1.00658	.6734
2600.	2.0138	50543.1	.02819	22.3348	.00038	1123.72	387.14	.10501	1.00608	.6591
2800.	1.8694	57871.5	.02618	22.2752	.00035	1303.44	407.73	.12307	1.00564	.6380
3000.	1.7421	67097.7	.02389	22.1945	.00033	1551.11	428.20	.14470	1.00526	.6115

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

24.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 20.300	.01152	2.4124	1.120	241.3	517.7	14.550	5.48	6.88	1741.
22.	.01163	2.3354	1.119	250.7	529.8	15.122	5.69	7.29	1729.
24.	.01176	2.2445	1.113	262.6	544.8	15.776	5.91	7.74	1715.
26.	.01190	2.1539	1.103	275.1	560.7	16.411	6.10	8.18	1700.
28.	.01205	2.0643	1.089	288.3	577.5	17.031	6.26	8.60	1683.
30.	.01221	1.9767	1.071	302.1	595.1	17.639	6.41	9.00	1666.
32.	.01237	1.8918	1.051	316.5	613.5	18.232	6.53	9.39	1649.
34.	.01255	1.8136	1.029	331.5	632.7	18.815	6.64	9.76	1633.
36.	.01273	1.7350	1.002	347.0	652.6	19.383	6.73	10.11	1614.
38.	.01292	1.6620	.9740	363.0	673.1	19.939	6.80	10.43	1596.
40.	.01312	1.5846	.9451	379.3	694.3	20.481	6.85	10.74	1576.
42.	.01333	1.5207	.9154	396.1	716.1	21.012	6.90	11.01	1558.
44.	.01355	1.4602	.8853	413.1	738.3	21.530	6.94	11.27	1541.
46.	.01378	1.4025	.8548	429.9	760.6	22.025	7.00	11.55	1521.
48.	.01401	1.3475	.8245	447.6	784.0	22.522	7.05	11.81	1502.
50.	.01426	1.2986	.7946	465.6	807.8	23.009	7.09	12.03	1485.
55.	.01491	1.1903	.7228	511.5	869.3	24.180	7.15	12.52	1443.
60.	.01561	1.1015	.6558	558.4	933.0	25.290	7.16	12.86	1407.
65.	.01636	1.0314	.5943	605.4	998.0	26.328	7.15	13.11	1375.
70.	.01715	.9787	.5398	652.4	1064.0	27.307	7.16	13.28	1348.
75.	.01798	.9401	.4919	699.3	1130.7	28.228	7.18	13.42	1326.
80.	.01884	.9126	.4499	746.0	1198.1	29.098	7.22	13.52	1307.
90.	.02063	.8860	.3806	838.7	1333.8	30.697	7.36	13.62	1281.
100.	.02248	.8836	.3273	930.8	1470.3	32.135	7.55	13.68	1265.
110.	.02437	.8972	.2857	1024.3	1609.1	33.456	7.87	13.81	1255.
120.	.02626	.9203	.2531	1117.2	1747.4	34.660	8.12	13.88	1254.
140.	.03005	.9814	.2057	1305.4	2026.6	36.811	8.63	14.08	1265.
160.	.03382	1.0549	.1732	1498.2	2309.9	38.702	9.07	14.27	1289.
180.	.03756	1.1359	.1494	1695.3	2596.7	40.391	9.43	14.42	1318.
200.	.04125	1.2194	.1313	1896.1	2886.1	41.915	9.72	14.53	1350.
220.	.04489	1.3032	.1171	2099.9	3177.3	43.303	9.95	14.61	1384.
240.	.04849	1.3873	.1057	2306.0	3469.8	44.576	10.11	14.66	1418.
260.	.05206	1.4706	.0963	2513.6	3762.9	45.750	10.24	14.68	1452.
280.	.05559	1.5537	.0885	2722.2	4056.4	46.837	10.32	14.68	1486.
300.	.05925	1.6440	.0828	2931.4	4353.5	47.851	10.36	14.75	1530.
350.	.06806	1.8531	.0701	3457.4	5090.8	50.125	10.43	14.73	1618.
400.	.07679	2.0610	.0609	3983.5	5826.6	52.090	10.45	14.70	1702.
450.	.08549	2.2681	.0539	4508.9	6560.6	53.819	10.45	14.66	1784.
500.	.09415	2.4746	.0483	5033.4	7293.0	55.362	10.46	14.64	1861.
550.	.10280	2.6808	.0438	5557.2	8024.5	56.756	10.46	14.62	1936.
600.	.11143	2.8867	.0401	6081.4	8755.8	58.026	10.47	14.62	2008.
650.	.12006	3.0925	.0370	6605.6	9487.1	59.193	10.49	14.63	2077.
700.	.12868	3.2983	.0343	7131.1	10219.3	60.285	10.51	14.65	2144.
750.	.13729	3.5039	.0320	7658.1	10953.0	61.299	10.55	14.68	2208.
800.	.14589	3.7096	.0300	8187.0	11688.5	62.249	10.60	14.73	2271.
850.	.15450	3.9153	.0282	8718.4	12426.4	63.143	10.65	14.78	2331.
900.	.16310	4.1209	.0266	9252.7	13167.2	63.988	10.72	14.85	2389.
950.	.17170	4.3266	.0252	9790.3	13911.2	64.792	10.79	14.92	2445.
1000.	.18030	4.5323	.0240	10331.6	14658.8	65.558	10.88	15.00	2500.
1100.	.19749	4.9437	.0218	11428.4	16168.2	66.986	11.06	15.18	2605.
1200.	.21468	5.3553	.0200	12544.3	17696.7	68.308	11.25	15.37	2705.
1300.	.23187	5.7668	.0184	13680.7	19245.6	69.547	11.47	15.58	2800.
1400.	.24906	6.1785	.0171	14838.4	20815.8	70.718	11.69	15.81	2891.
1500.	.26625	6.5902	.0160	16017.7	22407.6	71.830	11.91	16.03	2978.
1600.	.28343	7.0020	.0150	17217.7	24020.0	72.864	12.13	16.24	3063.
1700.	.30062	7.4138	.0141	18439.2	25654.0	73.850	12.34	16.46	3145.
1800.	.31780	7.8257	.0133	19682.2	27309.5	74.795	12.55	16.67	3224.
2000.	.35219	8.6496	.0120	22233.2	30685.7	76.584	12.97	17.09	3376.
2200.	.38661	9.4736	.0109	24868.4	34146.9	78.226	13.45	17.58	3520.
2400.	.42112	10.2977	.0100	27611.3	37718.2	79.774	14.04	18.21	3654.
2600.	.45584	11.1219	.0092	30498.4	41438.7	81.263	14.85	19.08	3780.
2800.	.49096	11.9462	.0086	33586.2	45369.1	82.724	15.96	20.30	3898.
3000.	.52673	12.7705	.0080	36951.3	49592.8	84.189	17.46	21.99	4009.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

24.00 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	20.300	86.8172	1285.9	.23558	209.4394	.00535	140.60	402.08	.00085	1.28636	1.9669
	22.	86.0150	1307.8	.22862	200.8776	.00557	149.33	341.16	.00086	1.28349	1.6650
	24.	85.0394	1327.3	.22156	190.8687	.00583	156.68	289.73	.00086	1.28001	1.4318
	26.	84.0311	1341.6	.21532	180.9929	.00609	161.60	252.34	.00085	1.27641	1.2766
	28.	82.9915	1352.9	.20944	171.3226	.00635	164.70	224.16	.00083	1.27271	1.1702
	30.	81.9220	1360.7	.20411	161.9329	.00662	166.47	202.29	.00081	1.26891	1.0938
	32.	80.8245	1366.5	.19903	152.9007	.00687	166.02	184.88	.00079	1.26502	1.0458
	34.	79.6883	1371.4	.19451	144.5215	.00712	164.96	170.61	.00076	1.26100	1.0098
	36.	78.5450	1374.3	.18963	136.2770	.00735	163.55	158.91	.00074	1.25696	.9821
	38.	77.3810	1376.7	.18499	128.6050	.00757	161.82	149.05	.00072	1.25286	.9604
	40.	76.2003	1371.9	.18094	120.7474	.00783	159.86	140.62	.00070	1.24871	.9446
	42.	75.0009	1371.8	.17700	114.0513	.00803	157.68	133.31	.00069	1.24450	.9309
	44.	73.7929	1372.1	.17297	107.7547	.00822	155.42	126.92	.00067	1.24027	.9205
	46.	72.5767	1375.8	.16816	101.7880	.00840	153.12	121.26	.00066	1.23602	.9150
	48.	71.3536	1377.0	.16385	96.1475	.00858	150.81	116.22	.00064	1.23176	.9100
	50.	70.1302	1379.2	.15979	91.0690	.00873	148.52	111.70	.00063	1.22750	.9050
	55.	67.0791	1382.8	.15064	79.8470	.00905	143.00	102.17	.00061	1.21693	.8944
	60.	64.0694	1384.2	.14304	70.5749	.00929	138.07	94.60	.00060	1.20657	.8813
	65.	61.1381	1390.6	.13594	63.0573	.00943	134.45	88.52	.00060	1.19653	.8629
	70.	58.3171	1404.7	.12933	57.0761	.00946	131.14	83.62	.00061	1.18692	.8471
	75.	55.6308	1426.4	.12318	52.3013	.00941	128.15	79.71	.00062	1.17782	.8345
	80.	53.0883	1455.4	.11739	48.4474	.00929	125.56	76.60	.00063	1.16925	.8246
	90.	48.4772	1537.1	.10669	42.9526	.00886	125.31	72.33	.00068	1.15381	.7863
	100.	44.4809	1642.9	.09740	39.3019	.00833	125.53	69.96	.00074	1.14055	.7623
	110.	41.0414	1780.0	.08846	36.8214	.00776	130.14	69.75	.00083	1.12921	.7403
	120.	38.0809	1922.6	.08180	35.0463	.00722	130.28	69.04	.00089	1.11952	.7357
	140.	33.2795	2235.1	.07165	32.6598	.00630	134.18	69.37	.00103	1.10392	.7279
	160.	29.5650	2570.4	.06460	31.1885	.00555	140.11	71.08	.00120	1.09196	.7242
	180.	26.6240	2919.4	.05949	30.2420	.00494	147.13	73.60	.00138	1.08255	.7215
	200.	24.2438	3271.7	.05571	29.5624	.00444	154.84	76.58	.00158	1.07498	.7186
	220.	22.2769	3622.4	.05285	29.0318	.00403	162.97	79.85	.00180	1.06876	.7158
	240.	20.6220	3968.1	.05066	28.6092	.00369	171.29	83.27	.00204	1.06353	.7125
	260.	19.2104	4306.9	.04896	28.2515	.00341	179.66	86.79	.00229	1.05910	.7091
	280.	17.9895	4638.6	.04763	27.9499	.00316	188.00	90.36	.00256	1.05527	.7055
	300.	16.8763	4941.5	.04739	27.7448	.00299	196.24	93.94	.00284	1.05179	.7062
	350.	14.6938	5720.3	.04576	27.2296	.00258	216.32	102.88	.00360	1.04498	.7007
	400.	13.0222	6476.6	.04475	26.8391	.00227	235.60	111.69	.00443	1.03979	.6967
	450.	11.6977	7219.7	.04406	26.5315	.00203	254.22	120.30	.00534	1.03569	.6937
	500.	10.6210	7961.5	.04352	26.2827	.00184	272.32	128.70	.00631	1.03237	.6918
	550.	9.7276	8700.6	.04308	26.0774	.00168	290.06	136.91	.00734	1.02962	.6903
	600.	8.9739	9443.0	.04270	25.9051	.00155	307.55	144.92	.00844	1.02730	.6891
	650.	8.3293	10189.0	.04235	25.7585	.00144	324.87	152.76	.00960	1.02532	.6880
	700.	7.7715	10944.3	.04200	25.6324	.00134	342.10	160.44	.01081	1.02361	.6872
	750.	7.2840	11708.3	.04165	25.5227	.00125	359.29	167.96	.01209	1.02212	.6865
	800.	6.8542	12483.7	.04130	25.4266	.00118	376.50	175.34	.01343	1.02081	.6859
	850.	6.4725	13272.4	.04093	25.3417	.00111	393.75	182.59	.01482	1.01964	.6855
	900.	6.1311	14075.5	.04055	25.2661	.00105	411.06	189.73	.01626	1.01860	.6852
	950.	5.8240	14894.1	.04015	25.1984	.00100	428.46	196.75	.01775	1.01766	.6851
	1000.	5.5463	15728.8	.03974	25.1375	.00095	445.96	203.67	.01930	1.01681	.6851
	1100.	5.0634	17435.3	.03892	25.0323	.00087	475.56	217.22	.02228	1.01534	.6933
	1200.	4.6580	19201.1	.03810	24.9447	.00080	511.00	230.43	.02569	1.01411	.6933
	1300.	4.3127	21025.2	.03728	24.8706	.00074	546.89	243.33	.02929	1.01305	.6934
	1400.	4.0151	22904.5	.03648	24.8072	.00069	583.16	255.94	.03308	1.01215	.6937
	1500.	3.7559	24834.2	.03571	24.7523	.00065	619.76	268.30	.03706	1.01136	.6940
	1600.	3.5282	26792.6	.03501	24.7043	.00061	656.21	280.42	.04122	1.01067	.6942
	1700.	3.3265	28788.4	.03435	24.6620	.00057	692.83	292.31	.04556	1.01006	.6943
	1800.	3.1466	30821.9	.03373	24.6243	.00054	729.72	303.98	.05009	1.00951	.6943
	2000.	2.8394	35027.2	.03255	24.5597	.00049	805.71	326.70	.05977	1.00858	.6930
	2200.	2.5866	39546.5	.03133	24.5045	.00044	889.55	344.89	.07041	1.00782	.6817
	2400.	2.3746	44586.5	.02995	24.4530	.00041	989.62	366.23	.08238	1.00717	.6740
	2600.	2.1937	50485.7	.02831	24.3985	.00038	1118.79	387.13	.09623	1.00663	.6602
	2800.	2.0368	57689.1	.02634	24.3325	.00035	1293.72	407.71	.11264	1.00615	.6398
	3000.	1.8985	66713.6	.02411	24.2450	.00033	1533.71	428.16	.13225	1.00573	.6139

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

26.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 20.756	.01144	2.4989	1.133	243.9	541.3	14.584	5.52	6.92	1769.
21.	.01145	2.4882	1.133	245.3	543.0	14.665	5.55	6.97	1768.
22.	.01151	2.4439	1.133	250.8	550.1	14.996	5.68	7.21	1762.
23.	.01158	2.3994	1.131	256.5	557.5	15.321	5.79	7.43	1755.
24.	.01164	2.3549	1.128	262.4	565.0	15.642	5.90	7.65	1748.
25.	.01171	2.3104	1.124	268.4	572.8	15.959	5.99	7.87	1741.
26.	.01177	2.2660	1.119	274.6	580.7	16.270	6.09	8.08	1734.
27.	.01184	2.2218	1.113	281.0	588.9	16.579	6.17	8.28	1727.
28.	.01191	2.1778	1.106	287.5	597.3	16.883	6.26	8.49	1719.
29.	.01199	2.1342	1.098	294.2	605.9	17.185	6.33	8.69	1711.
30.	.01206	2.0911	1.090	301.1	614.7	17.483	6.40	8.88	1703.
32.	.01222	2.0066	1.071	315.2	632.8	18.068	6.53	9.26	1687.
34.	.01238	1.9252	1.049	329.8	651.7	18.640	6.64	9.62	1670.
36.	.01255	1.8533	1.026	345.0	671.4	19.203	6.74	9.96	1655.
38.	.01273	1.7794	.9998	360.6	691.6	19.750	6.81	10.27	1638.
40.	.01292	1.7093	.9718	376.6	712.4	20.284	6.87	10.56	1621.
42.	.01311	1.6348	.9433	392.9	733.8	20.806	6.91	10.84	1601.
44.	.01331	1.5740	.9141	409.6	755.8	21.316	6.96	11.10	1585.
46.	.01352	1.5171	.8848	426.1	777.7	21.803	7.03	11.37	1567.
48.	.01374	1.4625	.8553	443.4	800.7	22.292	7.08	11.61	1549.
50.	.01396	1.4113	.8261	461.0	824.1	22.770	7.12	11.83	1532.
52.	.01420	1.3625	.7972	478.9	848.0	23.239	7.15	12.04	1515.
54.	.01444	1.3197	.7692	496.9	872.3	23.697	7.18	12.22	1499.
56.	.01468	1.2797	.7419	515.4	897.1	24.150	7.19	12.38	1484.
58.	.01494	1.2422	.7153	533.7	922.0	24.587	7.19	12.52	1471.
60.	.01520	1.2077	.6895	552.1	947.2	25.013	7.19	12.65	1457.
65.	.01588	1.1337	.6285	598.3	1011.1	26.035	7.19	12.90	1426.
70.	.01659	1.0741	.5733	644.7	1076.1	26.998	7.20	13.09	1398.
75.	.01734	1.0313	.5243	691.0	1141.9	27.906	7.22	13.23	1375.
80.	.01812	.9976	.4812	737.2	1208.4	28.765	7.26	13.36	1355.
85.	.01892	.9759	.4432	783.4	1275.4	29.578	7.32	13.45	1339.
90.	.01975	.9621	.4096	829.4	1342.8	30.349	7.40	13.52	1326.
95.	.02058	.9548	.3798	875.4	1410.5	31.080	7.49	13.57	1315.
100.	.02143	.9522	.3535	921.3	1478.5	31.777	7.59	13.62	1307.
110.	.02315	.9594	.3094	1014.9	1616.8	33.094	7.91	13.79	1294.
120.	.02488	.9781	.2744	1108.0	1755.0	34.297	8.16	13.88	1290.
140.	.02836	1.0328	.2233	1296.9	2034.2	36.449	8.66	14.09	1297.
160.	.03183	1.1016	.1881	1490.4	2317.8	38.341	9.10	14.30	1316.
180.	.03527	1.1794	.1623	1688.3	2605.3	40.034	9.46	14.46	1343.
200.	.03867	1.2608	.1426	1890.0	2895.5	41.563	9.75	14.57	1373.
220.	.04204	1.3439	.1271	2094.6	3187.6	42.955	9.98	14.65	1405.
240.	.04536	1.4264	.1147	2301.5	3480.9	44.232	10.15	14.70	1438.
260.	.04866	1.5096	.1045	2509.9	3774.9	45.409	10.27	14.72	1471.
280.	.05191	1.5918	.0959	2719.3	4069.1	46.499	10.35	14.72	1504.
300.	.05531	1.6819	.0898	2927.8	4366.0	47.511	10.37	14.78	1548.
350.	.06344	1.8902	.0760	3454.8	5104.3	49.788	10.44	14.75	1634.
400.	.07151	2.0975	.0660	3981.5	5840.8	51.756	10.46	14.71	1717.
450.	.07954	2.3040	.0584	4507.4	6575.4	53.485	10.46	14.67	1798.
500.	.08754	2.5101	.0523	5032.2	7308.3	55.029	10.46	14.65	1874.
550.	.09552	2.7159	.0475	5556.4	8040.0	56.424	10.47	14.63	1949.
600.	.10349	2.9215	.0435	6080.8	8771.6	57.694	10.48	14.63	2020.
650.	.11145	3.1270	.0401	6605.3	9503.1	58.862	10.49	14.64	2089.
700.	.11941	3.3324	.0372	7130.9	10235.5	59.954	10.52	14.66	2155.
750.	.12736	3.5379	.0347	7658.1	10969.3	60.968	10.55	14.69	2219.
800.	.13530	3.7433	.0325	8187.0	11704.9	61.918	10.60	14.73	2281.
850.	.14324	3.9487	.0306	8718.6	12442.9	62.812	10.66	14.78	2340.
900.	.15118	4.1542	.0289	9253.0	13183.7	63.658	10.72	14.85	2398.
950.	.15912	4.3597	.0273	9790.7	13927.8	64.461	10.80	14.92	2454.
1000.	.16706	4.5652	.0260	10332.0	14675.5	65.228	10.88	15.00	2509.
1100.	.18293	4.9763	.0236	11428.9	16185.0	66.656	11.06	15.18	2613.
1200.	.19879	5.3876	.0216	12544.9	17713.5	67.978	11.26	15.37	2713.
1300.	.21466	5.7989	.0200	13681.4	19262.5	69.217	11.47	15.59	2807.
1400.	.23052	6.2104	.0185	14839.1	20832.7	70.388	11.69	15.81	2898.
1500.	.24639	6.6219	.0173	16018.5	22424.5	71.500	11.91	16.03	2985.
1600.	.26225	7.0335	.0162	17218.5	24037.0	72.534	12.13	16.24	3069.
1700.	.27811	7.4452	.0153	18440.0	25670.9	73.520	12.34	16.46	3151.
1800.	.29397	7.8569	.0144	19683.0	27326.3	74.465	12.55	16.57	3230.
2000.	.32571	8.6806	.0130	22233.7	30702.2	76.254	12.97	17.09	3382.
2200.	.35748	9.5044	.0118	24867.8	34162.3	77.895	13.44	17.57	3526.
2400.	.38933	10.3283	.0108	27607.9	37730.6	79.442	14.02	18.19	3660.
2600.	.42137	11.1524	.0100	30488.9	41444.5	80.928	14.81	19.33	3786.
2800.	.45376	11.9766	.0093	33564.7	45362.4	82.384	15.88	20.22	3904.
3000.	.48673	12.8008	.0087	36909.0	49563.9	83.842	17.34	21.85	4015.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

26.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 20.756	87.4223	1333.3	.23481	218.4609	.00519	145.72	414.39	.00087	1.28853	1.9666
21.	87.3115	1336.9	.23377	217.2446	.00522	147.08	404.17	.00087	1.28813	1.9165
22.	86.8520	1350.5	.22978	212.2542	.00534	152.10	366.94	.00087	1.28649	1.7391
23.	86.3845	1362.3	.22612	207.2732	.00546	156.29	335.97	.00088	1.28481	1.5982
24.	85.9092	1372.7	.22269	202.3095	.00558	159.79	309.91	.00087	1.28311	1.4847
25.	85.4264	1381.6	.21949	197.3713	.00570	162.68	287.75	.00087	1.28139	1.3917
26.	84.9362	1389.5	.21644	192.4670	.00581	164.99	268.72	.00087	1.27964	1.3156
27.	84.4389	1396.6	.21347	187.6052	.00593	166.85	252.24	.00086	1.27786	1.2524
28.	83.9345	1403.1	.21057	182.7946	.00605	168.31	237.85	.00085	1.27607	1.1996
29.	83.4234	1408.7	.20782	178.0440	.00617	169.45	225.21	.00084	1.27425	1.1548
30.	82.9055	1413.0	.20527	173.3623	.00629	170.28	214.02	.00083	1.27240	1.1162
32.	81.8507	1420.6	.20025	164.2410	.00652	169.98	195.14	.00081	1.26866	1.0632
34.	80.7719	1426.0	.19559	155.5019	.00675	169.08	179.85	.00078	1.26483	1.0236
36.	79.6580	1432.8	.19126	147.6268	.00695	167.71	167.14	.00076	1.26089	.9928
38.	78.5436	1436.3	.18680	139.7629	.00715	166.06	156.61	.00074	1.25696	.9689
40.	77.4132	1437.3	.18278	132.3252	.00734	164.18	147.64	.00072	1.25297	.9492
42.	76.2690	1433.2	.17891	124.6851	.00757	162.08	139.91	.00071	1.24895	.9360
44.	75.1118	1435.1	.17497	118.2239	.00773	159.87	133.16	.00069	1.24489	.9242
46.	73.9473	1441.4	.17026	112.1823	.00789	157.60	127.21	.00067	1.24081	.9175
48.	72.7792	1445.0	.16603	106.4422	.00804	155.33	121.92	.00066	1.23673	.9113
50.	71.6093	1447.8	.16204	101.0649	.00817	153.07	117.19	.00065	1.23265	.9060
52.	70.4365	1449.5	.15827	95.9713	.00831	150.83	112.92	.00064	1.22857	.9014
54.	69.2688	1452.4	.15475	91.4121	.00841	148.65	109.05	.00063	1.22451	.8966
56.	68.1060	1454.7	.15149	87.1538	.00851	146.52	105.53	.00063	1.22049	.8919
58.	66.9501	1455.9	.14856	83.1667	.00860	144.45	102.32	.00062	1.21649	.8869
60.	65.8029	1457.5	.14571	79.4700	.00868	142.65	99.37	.00062	1.21253	.8809
65.	62.9868	1465.4	.13878	71.4067	.00880	139.03	93.00	.00062	1.20286	.8628
70.	60.2661	1478.5	.13218	64.7324	.00886	135.67	87.84	.00062	1.19355	.8478
75.	57.6618	1500.7	.12597	59.4679	.00882	132.61	83.67	.00063	1.18470	.8349
80.	55.1834	1528.0	.12014	55.0509	.00874	129.92	80.31	.00063	1.17631	.8257
85.	52.8431	1564.5	.11460	51.5670	.00859	129.71	77.63	.00066	1.16842	.8047
90.	50.6437	1607.9	.10932	48.7231	.00841	129.54	75.53	.00068	1.16105	.7881
95.	48.5853	1657.0	.10442	46.3870	.00819	129.47	73.92	.00071	1.15417	.7746
100.	46.6621	1711.6	.09981	44.4301	.00796	129.57	72.71	.00073	1.14777	.7642
110.	43.1971	1846.7	.09062	41.4432	.00747	134.17	71.85	.00081	1.13631	.7384
120.	40.1885	1987.8	.08371	39.3070	.00698	134.01	71.01	.00087	1.12641	.7353
140.	35.2629	2298.5	.07314	36.4196	.00613	137.65	71.05	.00100	1.11035	.7274
160.	31.4218	2631.9	.06580	34.6155	.00543	143.28	72.52	.00115	1.09793	.7238
180.	28.3535	2979.7	.06050	33.4409	.00485	149.94	74.82	.00132	1.08808	.7216
200.	25.8571	3331.7	.05657	32.6018	.00437	157.27	77.63	.00150	1.08011	.7194
220.	23.7883	3684.1	.05358	31.9687	.00398	165.05	80.76	.00170	1.07354	.7169
240.	22.0442	4030.1	.05128	31.4449	.00365	173.07	84.07	.00192	1.06802	.7140
260.	20.5527	4371.3	.04950	31.0273	.00337	181.18	87.49	.00216	1.06332	.7108
280.	19.2624	4704.2	.04809	30.6617	.00313	189.31	90.98	.00240	1.05926	.7073
300.	18.0791	5001.5	.04791	30.4077	.00295	197.38	94.50	.00266	1.05555	.7075
350.	15.7624	5780.6	.04619	29.7942	.00255	217.13	103.32	.00336	1.04831	.7019
400.	13.9841	6537.0	.04511	29.3312	.00225	236.22	112.04	.00413	1.04278	.6977
450.	12.5726	7280.3	.04438	28.9676	.00201	254.70	120.59	.00497	1.03840	.6945
500.	11.4235	8022.1	.04380	28.6740	.00183	272.71	128.95	.00587	1.03485	.6925
550.	10.4688	8761.2	.04334	28.4319	.00167	290.38	137.13	.00683	1.03190	.6909
600.	9.6626	9503.6	.04293	28.2290	.00154	307.82	145.11	.00784	1.02942	.6896
650.	8.9724	10249.6	.04256	28.0565	.00143	325.10	152.93	.00891	1.02730	.6884
700.	8.3747	11005.0	.04219	27.9082	.00133	342.30	160.59	.01004	1.02546	.6876
750.	7.8520	11768.9	.04183	27.7794	.00125	359.48	168.09	.01122	1.02386	.6868
800.	7.3910	12544.5	.04146	27.6665	.00117	376.66	175.46	.01246	1.02245	.6862
850.	6.9812	13333.2	.04108	27.5668	.00111	393.89	182.71	.01374	1.02119	.6857
900.	6.6145	14136.5	.04069	27.4781	.00105	411.19	189.83	.01507	1.02007	.6854
950.	6.2845	14955.3	.04028	27.3987	.00100	428.58	196.84	.01645	1.01906	.6853
1000.	5.9860	15790.2	.03986	27.3273	.00095	446.07	203.76	.01788	1.01815	.6853
1100.	5.4667	17497.2	.03903	27.2039	.00087	475.56	217.29	.02063	1.01657	.6935
1200.	5.0303	19263.6	.03820	27.1013	.00080	511.00	230.49	.02379	1.01524	.6935
1300.	4.6585	21088.3	.03737	27.0146	.00074	546.89	243.38	.02712	1.01411	.6936
1400.	4.3380	22968.3	.03656	26.9404	.00069	583.16	256.00	.03062	1.01313	.6938
1500.	4.0587	24898.6	.03579	26.8762	.00064	619.75	268.35	.03429	1.01228	.6941
1600.	3.8132	26857.6	.03508	26.8201	.00060	656.20	280.47	.03814	1.01154	.6943
1700.	3.5957	28853.6	.03441	26.7706	.00057	692.80	292.35	.04215	1.01088	.6944
1800.	3.4017	30886.9	.03379	26.7266	.00054	729.66	304.02	.04634	1.01029	.6944
2000.	3.0702	35088.7	.03261	26.6512	.00049	805.47	326.73	.05527	1.00928	.6932
2200.	2.7974	39595.8	.03139	26.5872	.00044	888.79	344.89	.06508	1.00845	.6820
2400.	2.5685	44605.6	.03003	26.5282	.00041	987.66	366.22	.07610	1.00776	.6745
2600.	2.3732	50443.1	.02842	26.4668	.00038	1114.43	387.12	.08882	1.00717	.6612
2800.	2.2038	57536.4	.02650	26.3942	.00035	1285.14	407.69	.10384	1.00666	.6413
3000.	2.0545	66383.1	.02430	26.2996	.00033	1518.35	428.12	.12176	1.00620	.6161

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

28.00 MPA ISOBAR

	TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
*	21.205	.01136	2.5840	1.146	246.7	564.8	14.616	5.56	6.95	1797.
	22.	.01141	2.5495	1.146	251.0	570.4	14.876	5.66	7.14	1793.
	23.	.01147	2.5061	1.145	256.6	577.7	15.198	5.78	7.36	1787.
	24.	.01153	2.4625	1.142	262.3	585.1	15.516	5.88	7.57	1780.
	25.	.01159	2.4189	1.139	268.3	592.8	15.829	5.98	7.78	1774.
	26.	.01166	2.3753	1.134	274.4	600.7	16.137	6.08	7.99	1767.
	27.	.01172	2.3318	1.129	280.6	608.8	16.443	6.17	8.19	1760.
	28.	.01179	2.2884	1.122	287.0	617.1	16.743	6.25	8.39	1753.
	29.	.01186	2.2454	1.115	293.6	625.6	17.041	6.33	8.59	1745.
	30.	.01193	2.2027	1.107	300.3	634.2	17.335	6.40	8.77	1738.
	32.	.01207	2.1188	1.089	314.1	652.2	17.913	6.53	9.14	1722.
	34.	.01223	2.0374	1.069	328.4	670.8	18.478	6.64	9.50	1706.
	36.	.01239	1.9594	1.047	343.3	690.1	19.031	6.74	9.83	1690.
	38.	.01256	1.8935	1.023	358.6	710.2	19.574	6.82	10.14	1677.
	40.	.01273	1.8243	.9969	374.3	730.8	20.101	6.88	10.41	1662.
	42.	.01291	1.7570	.9693	390.3	751.9	20.615	6.93	10.67	1645.
	44.	.01310	1.6857	.9413	406.7	773.5	21.117	6.97	10.94	1626.
	46.	.01329	1.6273	.9127	422.8	795.1	21.597	7.05	11.21	1609.
	48.	.01350	1.5737	.8841	439.8	817.7	22.079	7.10	11.44	1592.
	50.	.01370	1.5221	.8556	457.1	840.8	22.551	7.14	11.66	1576.
	52.	.01392	1.4731	.8273	474.6	864.3	23.012	7.18	11.86	1560.
	54.	.01414	1.4282	.7996	492.4	888.2	23.463	7.21	12.04	1545.
	56.	.01437	1.3862	.7726	510.5	912.7	23.910	7.22	12.20	1530.
	58.	.01460	1.3465	.7463	528.5	937.3	24.341	7.22	12.34	1516.
	60.	.01484	1.3108	.7209	546.6	962.1	24.761	7.22	12.46	1504.
	65.	.01546	1.2344	.6606	592.1	1025.1	25.767	7.22	12.72	1474.
	70.	.01612	1.1720	.6050	637.9	1089.2	26.718	7.23	12.91	1446.
	75.	.01680	1.1230	.5553	683.7	1154.1	27.614	7.25	13.07	1422.
	80.	.01751	1.0848	.5112	729.5	1219.8	28.462	7.30	13.21	1401.
	85.	.01824	1.0576	.4721	775.3	1286.1	29.267	7.36	13.32	1384.
	90.	.01900	1.0395	.4374	821.1	1352.9	30.031	7.43	13.41	1369.
	95.	.01976	1.0284	.4065	866.9	1420.2	30.758	7.52	13.48	1358.
	100.	.02054	1.0229	.3790	912.7	1487.8	31.451	7.63	13.55	1348.
	110.	.02212	1.0237	.3326	1006.4	1625.6	32.763	7.94	13.75	1332.
	120.	.02371	1.0378	.2955	1099.6	1763.5	33.964	8.19	13.87	1326.
	140.	.02692	1.0866	.2407	1289.0	2042.7	36.115	8.69	14.09	1328.
	160.	.03012	1.1497	.2029	1483.1	2326.6	38.009	9.12	14.32	1343.
	180.	.03331	1.2234	.1751	1681.8	2614.5	39.705	9.49	14.50	1367.
	200.	.03647	1.3033	.1539	1884.2	2905.4	41.237	9.78	14.61	1396.
	220.	.03960	1.3851	.1372	2089.6	3198.3	42.633	10.00	14.69	1426.
	240.	.04269	1.4673	.1237	2297.2	3492.4	43.913	10.18	14.74	1458.
	260.	.04574	1.5489	.1127	2506.3	3787.2	45.093	10.30	14.76	1490.
	280.	.04877	1.6308	.1034	2716.4	4082.1	46.186	10.39	14.75	1522.
	300.	.05193	1.7203	.0968	2924.5	4378.6	47.196	10.39	14.80	1565.
	350.	.05949	1.9276	.0819	3452.3	5117.9	49.476	10.45	14.77	1650.
	400.	.06698	2.1341	.0711	3979.7	5855.2	51.445	10.47	14.72	1732.
	450.	.07444	2.3401	.0629	4506.0	6590.3	53.177	10.47	14.68	1811.
	500.	.08187	2.5457	.0564	5031.2	7323.5	54.721	10.47	14.65	1888.
	550.	.08928	2.7511	.0511	5555.7	8055.6	56.117	10.47	14.64	1961.
	600.	.09668	2.9563	.0468	6080.3	8787.4	57.387	10.48	14.63	2032.
	650.	.10407	3.1614	.0431	6605.0	9519.1	58.555	10.50	14.64	2100.
	700.	.11146	3.3666	.0400	7130.8	10251.7	59.648	10.52	14.66	2166.
	750.	.11884	3.5717	.0373	7658.1	10985.6	60.662	10.56	14.69	2229.
	800.	.12622	3.7769	.0350	8187.2	11721.3	61.612	10.60	14.73	2291.
	850.	.13359	3.9821	.0329	8718.8	12459.4	62.506	10.66	14.78	2350.
	900.	.14096	4.1873	.0311	9253.3	13200.3	63.352	10.73	14.85	2408.
	950.	.14833	4.3926	.0294	9791.1	13944.4	64.156	10.80	14.92	2463.
	1000.	.15570	4.5980	.0279	10332.5	14692.2	64.922	10.88	15.00	2518.
	1100.	.17044	5.0088	.0254	11429.5	16201.7	66.350	11.06	15.18	2622.
	1200.	.18517	5.4197	.0233	12545.6	17730.3	67.672	11.26	15.37	2720.
	1300.	.19990	5.8308	.0215	13682.1	19279.3	68.911	11.47	15.59	2815.
	1400.	.21463	6.2420	.0200	14839.9	20849.6	70.082	11.69	15.81	2905.
	1500.	.22936	6.6533	.0186	16019.4	22441.4	71.195	11.91	16.03	2992.
	1600.	.24409	7.0648	.0175	17219.4	24053.9	72.228	12.13	16.24	3076.
	1700.	.25882	7.4763	.0164	18440.9	25687.8	73.214	12.34	16.46	3157.
	1800.	.27354	7.8879	.0155	19683.9	27343.1	74.159	12.55	16.66	3237.
	2000.	.30301	8.7112	.0140	22234.4	30718.7	75.948	12.96	17.09	3388.
	2200.	.33251	9.5348	.0127	24867.5	34177.8	77.589	13.43	17.57	3531.
	2400.	.36208	10.3586	.0116	27605.1	37743.4	79.134	14.01	18.17	3666.
	2600.	.39182	11.1825	.0108	30480.6	41451.6	80.618	14.77	18.99	3792.
	2800.	.42187	12.0065	.0100	33545.8	45358.2	82.070	15.82	20.14	3910.
	3000.	.45245	12.8306	.0093	36871.4	49540.0	83.522	17.23	21.72	4021.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

28.00 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	21.205	88.0083	1379.8	.23412	227.4110	.00504	150.72	426.76	.00089	1.29063	1.9688
	22.	87.6531	1391.6	.23094	223.4755	.00513	154.79	394.45	.00089	1.28936	1.8186
	23.	87.1999	1404.8	.22725	218.5311	.00524	159.15	360.09	.00089	1.28773	1.6650
	24.	86.7396	1416.4	.22379	213.5974	.00535	162.81	331.27	.00089	1.28608	1.5413
	25.	86.2722	1426.6	.22058	208.6821	.00546	165.84	306.83	.00089	1.28441	1.4402
	26.	85.7981	1435.7	.21752	203.7934	.00556	168.28	285.92	.00088	1.28272	1.3574
	27.	85.3174	1444.0	.21454	198.9393	.00567	170.25	267.85	.00088	1.28100	1.2888
	28.	84.8302	1451.7	.21164	194.1280	.00578	171.82	252.13	.00087	1.27926	1.2313
	29.	84.3368	1458.3	.20889	189.3677	.00589	173.05	238.34	.00086	1.27750	1.1825
	30.	83.8372	1463.6	.20634	184.6668	.00599	173.98	226.17	.00085	1.27572	1.1405
	32.	82.8205	1473.1	.20136	175.4760	.00621	173.80	205.70	.00083	1.27210	1.0822
	34.	81.7815	1480.0	.19675	166.6218	.00642	173.00	189.21	.00080	1.26841	1.0386
	36.	80.7222	1485.5	.19237	158.1692	.00662	171.77	175.65	.00078	1.26466	1.0056
	38.	79.6309	1493.7	.18835	150.7823	.00679	170.13	164.23	.00076	1.26080	.9786
	40.	78.5454	1496.5	.18450	143.2904	.00696	168.32	154.69	.00074	1.25696	.9568
	42.	77.4471	1498.1	.18068	136.0715	.00712	166.27	146.49	.00072	1.25309	.9402
	44.	76.3388	1495.8	.17683	128.6814	.00731	164.12	139.37	.00071	1.24919	.9292
	46.	75.2198	1503.3	.17217	122.4022	.00746	161.89	133.10	.00069	1.24527	.9216
	48.	74.0969	1509.3	.16802	116.6041	.00758	159.64	127.55	.00068	1.24133	.9143
	50.	72.9730	1513.8	.16410	111.0704	.00770	157.40	122.59	.00067	1.23740	.9082
	52.	71.8491	1517.2	.16039	105.8386	.00782	155.18	118.14	.00066	1.23348	.9029
	54.	70.7270	1520.8	.15690	101.0133	.00792	153.00	114.11	.00065	1.22958	.8978
	56.	69.6092	1523.5	.15370	96.4948	.00801	150.87	110.44	.00064	1.22569	.8929
	58.	68.4956	1524.7	.15083	92.2294	.00809	148.80	107.09	.00063	1.22183	.8879
	60.	67.3919	1527.1	.14806	88.3401	.00816	146.99	104.02	.00063	1.21802	.8819
	65.	64.6769	1537.1	.14136	79.8351	.00827	143.36	97.38	.00063	1.20866	.8639
	70.	62.0472	1552.0	.13480	72.7208	.00832	139.96	91.97	.00063	1.19964	.8485
	75.	59.5203	1573.1	.12858	66.8417	.00831	136.84	87.56	.00063	1.19101	.8363
	80.	57.1053	1600.4	.12268	61.9491	.00825	134.06	83.96	.00064	1.18281	.8270
	85.	54.8122	1635.4	.11709	57.9683	.00814	133.82	81.05	.00066	1.17506	.8067
	90.	52.6444	1677.9	.11176	54.7214	.00799	133.59	78.73	.00068	1.16776	.7903
	95.	50.6046	1726.3	.10678	52.0429	.00781	133.45	76.89	.00070	1.16092	.7770
	100.	48.6892	1780.6	.10208	49.8064	.00761	133.46	75.48	.00073	1.15452	.7663
	110.	45.2146	1914.0	.09266	46.2866	.00719	138.02	73.86	.00080	1.14297	.7361
	120.	42.1725	2053.7	.08556	43.7660	.00675	137.58	72.90	.00085	1.13293	.7348
	140.	37.1500	2363.7	.07460	40.3688	.00596	141.05	72.71	.00097	1.11648	.7266
	160.	33.1965	2694.2	.06698	38.1655	.00532	146.47	73.95	.00111	1.10365	.7230
	180.	30.0178	3039.7	.06149	36.7232	.00477	152.81	76.06	.00126	1.09341	.7215
	200.	27.4181	3392.7	.05741	35.7338	.00431	159.79	78.70	.00144	1.08509	.7197
	220.	25.2544	3746.2	.05429	34.9799	.00392	167.22	81.69	.00162	1.07819	.7177
	240.	23.4269	4094.4	.05190	34.3718	.00360	174.93	84.89	.00182	1.07239	.7151
	260.	21.8607	4435.5	.05003	33.8600	.00333	182.79	88.22	.00204	1.06744	.7122
	280.	20.5035	4770.5	.04856	33.4365	.00309	190.69	91.63	.00227	1.06316	.7089
	300.	19.2549	5061.9	.04842	33.1238	.00292	198.58	95.08	.00251	1.05924	.7086
	350.	16.8102	5841.2	.04661	32.4031	.00253	218.00	103.78	.00316	1.05158	.7030
	400.	14.9294	6597.7	.04548	31.8614	.00223	236.87	112.41	.00388	1.04572	.6986
	450.	13.4340	7341.0	.04470	31.4371	.00200	255.21	120.90	.00466	1.04107	.6953
	500.	12.2147	8082.9	.04408	31.0949	.00181	273.12	129.22	.00549	1.03729	.6932
	550.	11.2005	8822.0	.04359	30.8132	.00166	290.72	137.35	.00638	1.03416	.6915
	600.	10.3431	9564.3	.04315	30.5772	.00153	308.10	145.31	.00733	1.03152	.6901
	650.	9.6085	10310.3	.04277	30.3767	.00142	325.35	153.10	.00833	1.02925	.6889
	700.	8.9719	11065.6	.04238	30.2045	.00132	342.52	160.74	.00938	1.02730	.6879
	750.	8.4147	11829.6	.04200	30.0549	.00124	359.67	168.23	.01048	1.02559	.6871
	800.	7.9229	12605.2	.04162	29.9238	.00117	376.83	175.59	.01162	1.02408	.6864
	850.	7.4855	13394.0	.04123	29.8081	.00110	394.05	182.82	.01282	1.02274	.6859
	900.	7.0941	14197.4	.04083	29.7053	.00105	411.33	189.94	.01406	1.02154	.6856
	950.	6.7416	15016.4	.04041	29.6133	.00099	428.71	196.94	.01534	1.02046	.6854
	1000.	6.4225	15851.5	.03998	29.5305	.00095	446.19	203.85	.01667	1.01949	.6854
	1100.	5.8673	17559.0	.03914	29.3876	.00086	475.56	217.37	.01922	1.01779	.6938
	1200.	5.4005	19325.9	.03830	29.2688	.00080	511.00	230.56	.02216	1.01637	.6937
	1300.	5.0025	21151.2	.03746	29.1685	.00074	546.89	243.45	.02525	1.01515	.6938
	1400.	4.6592	23031.8	.03664	29.0827	.00069	583.16	256.05	.02851	1.01411	.6940
	1500.	4.3600	24962.8	.03586	29.0084	.00064	619.75	268.40	.03192	1.01320	.6942
	1600.	4.0969	26922.2	.03515	28.9436	.00060	656.19	280.51	.03550	1.01240	.6944
	1700.	3.8638	28918.5	.03448	28.8865	.00057	692.78	292.39	.03922	1.01169	.6945
	1800.	3.6557	30951.8	.03385	28.8357	.00054	729.61	304.06	.04311	1.01106	.6945
	2000.	3.3002	35150.5	.03266	28.7488	.00049	805.25	326.76	.05141	1.00998	.6933
	2200.	3.0074	39646.8	.03145	28.6754	.00044	888.11	344.88	.06052	1.00909	.6822
	2400.	2.7618	44629.8	.03011	28.6083	.00041	985.91	366.22	.07073	1.00835	.6750
	2600.	2.5522	50412.5	.02852	28.5397	.00038	1110.55	387.11	.08248	1.00771	.6621
	2800.	2.3704	57407.8	.02663	28.4601	.00035	1277.49	407.68	.09633	1.00716	.6428
	3000.	2.2102	66096.2	.02448	28.3582	.00033	1504.66	428.08	.11282	1.00668	.6180

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

30.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 21.645	.01129	2.6677	1.159	249.4	588.1	14.647	5.60	6.99	1824.
22.	.01131	2.6527	1.159	251.3	590.6	14.761	5.65	7.07	1823.
23.	.01137	2.6102	1.158	256.8	597.8	15.081	5.76	7.29	1817.
24.	.01142	2.5675	1.156	262.5	605.2	15.396	5.87	7.50	1811.
25.	.01148	2.5247	1.153	268.3	612.8	15.706	5.97	7.71	1805.
26.	.01154	2.4819	1.149	274.3	620.6	16.010	6.07	7.91	1799.
27.	.01161	2.4391	1.144	280.4	628.6	16.313	6.16	8.11	1792.
28.	.01167	2.3964	1.138	286.7	636.8	16.610	6.24	8.30	1785.
29.	.01174	2.3539	1.131	293.1	645.2	16.905	6.32	8.49	1778.
30.	.01180	2.3117	1.123	299.7	653.8	17.196	6.39	8.68	1771.
32.	.01194	2.2285	1.107	313.3	671.5	17.768	6.53	9.04	1756.
34.	.01209	2.1473	1.088	327.3	689.9	18.326	6.65	9.38	1741.
36.	.01224	2.0691	1.067	341.9	709.0	18.872	6.75	9.71	1726.
38.	.01240	1.9944	1.044	356.9	728.8	19.406	6.83	10.02	1711.
40.	.01256	1.9328	1.020	372.3	749.2	19.929	6.89	10.29	1699.
42.	.01273	1.8695	.9938	388.1	770.0	20.437	6.94	10.54	1685.
44.	.01291	1.8048	.9667	404.2	791.3	20.933	6.99	10.78	1669.
46.	.01309	1.7369	.9392	420.0	812.6	21.406	7.07	11.07	1649.
48.	.01328	1.6806	.9112	436.7	835.0	21.882	7.12	11.30	1633.
50.	.01347	1.6300	.8834	453.7	857.8	22.347	7.17	11.51	1618.
52.	.01367	1.5811	.8557	470.9	881.0	22.802	7.20	11.70	1603.
54.	.01387	1.5340	.8284	488.4	904.6	23.248	7.23	11.88	1588.
56.	.01408	1.4913	.8017	506.2	928.8	23.688	7.25	12.04	1574.
58.	.01430	1.4507	.7756	524.0	953.0	24.113	7.25	12.17	1560.
60.	.01452	1.4139	.7504	541.8	977.5	24.528	7.26	12.29	1548.
65.	.01510	1.3324	.6905	586.7	1039.6	25.522	7.26	12.56	1518.
70.	.01570	1.2694	.6352	631.9	1103.0	26.461	7.27	12.75	1492.
75.	.01633	1.2140	.5848	677.2	1167.2	27.347	7.29	12.93	1467.
80.	.01698	1.1744	.5399	722.6	1232.2	28.186	7.33	13.06	1446.
85.	.01766	1.1411	.4998	768.1	1297.8	28.982	7.39	13.19	1427.
90.	.01835	1.1182	.4642	813.6	1364.0	29.740	7.47	13.31	1411.
95.	.01905	1.1033	.4323	859.2	1430.8	30.461	7.56	13.40	1399.
100.	.01977	1.0945	.4038	904.9	1498.0	31.151	7.66	13.48	1388.
110.	.02123	1.0897	.3553	998.5	1635.3	32.457	7.97	13.71	1369.
120.	.02270	1.0997	.3162	1091.8	1773.0	33.656	8.22	13.85	1361.
140.	.02568	1.1425	.2580	1281.7	2052.0	35.806	8.71	14.09	1359.
160.	.02865	1.2008	.2176	1476.3	2335.9	37.700	9.15	14.33	1371.
180.	.03162	1.2699	.1879	1675.5	2624.2	39.398	9.51	14.52	1392.
200.	.03457	1.3471	.1652	1878.7	2915.7	40.934	9.80	14.64	1418.
220.	.03749	1.4270	.1472	2084.8	3209.3	42.333	10.03	14.73	1447.
240.	.04037	1.5078	.1327	2293.1	3504.2	43.616	10.20	14.78	1478.
260.	.04322	1.5886	.1208	2502.9	3799.6	44.799	10.33	14.79	1508.
280.	.04605	1.6701	.1109	2713.7	4095.3	45.894	10.42	14.79	1540.
300.	.04901	1.7590	.1038	2921.2	4391.5	46.903	10.40	14.82	1583.
350.	.05606	1.9653	.0878	3449.9	5131.7	49.186	10.47	14.78	1666.
400.	.06306	2.1710	.0762	3977.9	5869.6	51.157	10.48	14.73	1747.
450.	.07002	2.3764	.0673	4504.7	6605.2	52.889	10.48	14.69	1825.
500.	.07695	2.5814	.0604	5030.3	7338.9	54.434	10.48	14.66	1900.
550.	.08387	2.7863	.0548	5555.1	8071.3	55.831	10.48	14.64	1973.
600.	.09078	2.9911	.0501	6079.9	8803.3	57.102	10.49	14.64	2043.
650.	.09768	3.1959	.0462	6604.8	9535.2	58.270	10.50	14.64	2111.
700.	.10457	3.4007	.0429	7130.8	10267.9	59.363	10.53	14.66	2176.
750.	.11146	3.6055	.0400	7658.2	11002.0	60.377	10.56	14.69	2239.
800.	.11834	3.8104	.0375	8187.4	11737.7	61.327	10.61	14.73	2300.
850.	.12522	4.0154	.0352	8719.2	12475.9	62.221	10.66	14.79	2359.
900.	.13210	4.2204	.0333	9253.8	13216.9	63.067	10.73	14.85	2417.
950.	.13898	4.4254	.0315	9791.6	13961.0	63.871	10.80	14.92	2472.
1000.	.14586	4.6306	.0299	10333.1	14708.8	64.637	10.89	15.00	2526.
1100.	.15961	5.0410	.0272	11430.2	16218.5	66.065	11.06	15.18	2630.
1200.	.17336	5.4516	.0249	12546.4	17747.1	67.388	11.26	15.38	2728.
1300.	.18711	5.8624	.0230	13683.0	19296.1	68.627	11.47	15.59	2822.
1400.	.20085	6.2734	.0214	14840.9	20866.4	69.798	11.69	15.81	2912.
1500.	.21460	6.6845	.0200	16020.3	22458.3	70.910	11.92	16.03	2999.
1600.	.22834	7.0957	.0187	17220.4	24070.7	71.944	12.13	16.24	3083.
1700.	.24209	7.5070	.0176	18442.0	25704.6	72.930	12.34	16.46	3164.
1800.	.25583	7.9185	.0166	19684.9	27359.9	73.875	12.55	16.66	3243.
2000.	.28334	8.7415	.0150	22235.1	30735.2	75.663	12.96	17.08	3394.
2200.	.31086	9.5643	.0136	24867.4	34193.3	77.303	13.43	17.56	3537.
2400.	.33846	10.3885	.0125	27602.8	37756.6	78.848	13.99	18.15	3671.
2600.	.36621	11.2122	.0115	30473.3	41459.6	80.330	14.74	18.96	3797.
2800.	.39424	12.0360	.0107	33529.0	45356.1	81.778	15.76	20.07	3915.
3000.	.42274	12.8600	.0100	36837.9	49520.2	83.224	17.13	21.61	4027.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

30.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 21.645	88.5767	1425.6	.23351	236.2981	.00490	155.60	439.19	.00090	1.29267	1.9731
22.	88.4220	1431.2	.23210	234.5564	.00494	157.41	423.85	.00091	1.29212	1.9038
23.	87.9818	1445.7	.22837	229.6496	.00504	161.94	385.75	.00091	1.29054	1.7364
24.	87.5348	1458.6	.22489	224.7472	.00514	165.74	353.91	.00091	1.28893	1.6019
25.	87.0814	1470.0	.22165	219.8570	.00524	168.92	326.99	.00091	1.28731	1.4921
26.	86.6217	1480.3	.21857	214.9865	.00534	171.47	304.01	.00090	1.28566	1.4022
27.	86.1559	1489.8	.21557	210.1434	.00544	173.55	284.22	.00089	1.28399	1.3277
28.	85.6841	1498.6	.21266	205.3357	.00554	175.23	267.04	.00089	1.28231	1.2653
29.	85.2066	1506.3	.20990	200.5710	.00564	176.55	252.01	.00088	1.28060	1.2123
30.	84.7234	1512.6	.20736	195.8572	.00574	177.56	238.78	.00087	1.27888	1.1668
32.	83.7407	1524.0	.20238	186.6133	.00593	177.50	216.60	.00084	1.27538	1.1028
34.	82.7375	1532.5	.19781	177.6659	.00612	176.80	198.81	.00082	1.27181	1.0549
36.	81.7153	1539.3	.19348	169.0756	.00631	175.66	184.24	.00080	1.26818	1.0187
38.	80.6760	1544.5	.18947	160.9016	.00649	174.14	172.12	.00078	1.26449	.9907
40.	79.6102	1551.8	.18598	153.8691	.00663	172.31	161.81	.00076	1.26072	.9660
42.	78.5503	1556.8	.18232	146.8531	.00677	170.30	153.10	.00074	1.25698	.9471
44.	77.4833	1559.9	.17853	139.8430	.00691	168.19	145.57	.00072	1.25322	.9332
46.	76.4083	1563.9	.17397	132.7170	.00708	166.00	138.97	.00071	1.24944	.9265
48.	75.3261	1570.1	.16985	126.5935	.00720	163.77	133.13	.00069	1.24564	.9187
50.	74.2419	1576.9	.16600	121.0169	.00730	161.54	127.93	.00068	1.24184	.9116
52.	73.1587	1582.1	.16235	115.6721	.00740	159.33	123.28	.00067	1.23805	.9056
54.	72.0777	1586.0	.15891	110.5687	.00749	157.15	119.07	.00066	1.23428	.9003
56.	70.9997	1589.9	.15573	105.8852	.00757	155.02	115.25	.00065	1.23053	.8949
58.	69.9274	1592.1	.15290	101.4425	.00765	152.95	111.77	.00065	1.22680	.8896
60.	68.8615	1595.3	.15018	97.3636	.00771	151.13	108.57	.00064	1.22310	.8832
65.	66.2364	1605.4	.14362	88.2558	.00782	147.49	101.67	.00064	1.21403	.8658
70.	63.6849	1623.3	.13722	80.8416	.00786	144.04	95.01	.00064	1.20525	.8501
75.	61.2321	1643.3	.13097	74.3388	.00787	140.86	91.38	.00064	1.19685	.8386
80.	58.8765	1672.6	.12505	69.1426	.00781	138.01	87.56	.00065	1.18882	.8286
85.	56.6333	1706.0	.11939	64.6270	.00773	137.75	84.44	.00066	1.18121	.8088
90.	54.5005	1747.3	.11401	60.9434	.00762	137.48	81.91	.00068	1.17400	.7928
95.	52.4837	1794.9	.10898	57.9045	.00747	137.27	79.87	.00070	1.16722	.7797
100.	50.5805	1848.6	.10421	55.3620	.00729	137.21	78.26	.00072	1.16084	.7690
110.	47.1078	1981.5	.09461	51.3345	.00692	141.68	75.77	.00079	1.14925	.7335
120.	44.0441	2120.7	.08733	48.4344	.00653	140.99	74.73	.00083	1.13910	.7338
140.	38.9443	2430.1	.07603	44.4929	.00580	144.37	74.34	.00095	1.12234	.7257
160.	34.8991	2759.8	.06814	41.9073	.00519	149.66	75.38	.00108	1.10917	.7217
180.	31.6242	3102.7	.06246	40.1595	.00468	155.73	77.30	.00122	1.09858	.7207
200.	28.9273	3454.8	.05824	38.9666	.00424	162.38	79.79	.00138	1.08992	.7196
220.	26.6772	3808.3	.05501	38.0675	.00387	169.48	82.64	.00155	1.08272	.7182
240.	24.7712	4157.2	.05252	37.3495	.00355	176.88	85.72	.00174	1.07666	.7160
260.	23.1356	4499.9	.05056	36.7534	.00329	184.47	88.96	.00194	1.07147	.7134
280.	21.7153	4837.0	.04902	36.2665	.00306	192.15	92.29	.00215	1.06698	.7103
300.	20.4046	5122.7	.04892	35.8926	.00289	199.84	95.68	.00238	1.06285	.7096
350.	17.8377	5902.1	.04702	35.0560	.00250	218.91	104.25	.00299	1.05479	.7040
400.	15.8585	6658.6	.04583	34.4295	.00221	237.55	112.80	.00366	1.04861	.6995
450.	14.2821	7401.9	.04501	33.9397	.00198	255.74	121.22	.00439	1.04370	.6961
500.	12.9948	8143.8	.04435	33.5454	.00180	273.55	129.4	.00517	1.03971	.6939
550.	11.9229	8882.8	.04383	33.2209	.00165	291.07	137.58	.00600	1.03639	.6921
600.	11.0157	9625.0	.04338	32.9494	.00152	308.40	145.51	.00689	1.03359	.6906
650.	10.2377	10371.0	.04297	32.7188	.00141	325.60	153.28	.00782	1.03119	.6893
700.	9.5629	11126.3	.04257	32.5208	.00132	342.74	160.90	.00880	1.02911	.6883
750.	8.9720	11890.3	.04218	32.3489	.00124	359.86	168.38	.00983	1.02730	.6874
800.	8.4501	12665.9	.04178	32.1984	.00116	377.00	175.72	.01090	1.02569	.6867
850.	7.9857	13454.8	.04138	32.0656	.00110	394.20	182.94	.01202	1.02427	.6862
900.	7.5698	14258.3	.04096	31.9475	.00104	411.47	190.05	.01318	1.02300	.6858
950.	7.1952	15077.5	.04054	31.8419	.00099	428.84	197.04	.01438	1.02185	.6856
1000.	6.8559	15912.7	.04010	31.7470	.00094	446.31	203.94	.01562	1.02081	.6856
1100.	6.2653	17620.6	.03925	31.5832	.00086	475.56	217.45	.01800	1.01901	.6941
1200.	5.7684	19388.1	.03839	31.4470	.00079	511.00	230.63	.02074	1.01749	.6939
1300.	5.3446	21214.0	.03754	31.3321	.00073	546.89	243.51	.02364	1.01620	.6940
1400.	4.9788	23095.2	.03672	31.2338	.00068	583.16	256.11	.02668	1.01508	.6941
1500.	4.6599	25026.8	.03593	31.1489	.00064	619.75	268.45	.02987	1.01411	.6944
1600.	4.3794	26986.7	.03521	31.0748	.00060	656.19	280.56	.03321	1.01326	.6946
1700.	4.1307	28983.3	.03454	31.0095	.00057	692.75	292.44	.03669	1.01250	.6947
1800.	3.9088	31016.4	.03390	30.9514	.00054	729.56	304.10	.04032	1.01183	.6946
2000.	3.5294	35212.6	.03272	30.8523	.00049	805.05	326.80	.04807	1.01067	.6935
2200.	3.2168	39699.2	.03151	30.7688	.00044	887.50	344.88	.05656	1.00973	.6823
2400.	2.9545	44658.2	.03018	30.6932	.00041	984.33	366.22	.06607	1.00893	.6754
2600.	2.7307	50391.8	.02861	30.6170	.00038	1107.06	387.11	.07699	1.00825	.6629
2800.	2.5366	57299.2	.02676	30.5300	.00035	1270.62	407.66	.08983	1.00766	.6441
3000.	2.3655	65845.4	.02464	30.4206	.00033	1492.37	428.05	.10510	1.00715	.6198

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

35.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 22.715	.01112	2.8721	1.190	256.6	645.8	14.721	5.70	7.08	1889.
23.	.01113	2.8606	1.190	258.1	647.8	14.809	5.73	7.14	1888.
24.	.01119	2.8201	1.189	263.5	655.0	15.117	5.84	7.35	1883.
25.	.01124	2.7794	1.186	269.1	662.5	15.421	5.94	7.54	1878.
26.	.01129	2.7385	1.183	274.8	670.1	15.719	6.04	7.74	1873.
27.	.01135	2.6975	1.179	280.7	678.0	16.015	6.14	7.93	1867.
28.	.01141	2.6564	1.174	286.7	686.0	16.305	6.22	8.11	1861.
29.	.01147	2.6154	1.168	292.9	694.2	16.594	6.31	8.30	1855.
30.	.01152	2.5745	1.161	299.2	702.6	16.878	6.38	8.47	1848.
32.	.01165	2.4933	1.147	312.2	719.8	17.436	6.52	8.81	1835.
34.	.01177	2.4133	1.130	325.7	737.8	17.980	6.65	9.14	1822.
36.	.01191	2.3352	1.111	339.7	756.4	18.512	6.75	9.45	1808.
38.	.01204	2.2595	1.091	354.1	775.6	19.031	6.85	9.75	1794.
40.	.01219	2.1869	1.069	368.8	795.4	19.538	6.91	10.02	1780.
42.	.01233	2.1179	1.047	384.0	815.7	20.033	6.97	10.27	1767.
44.	.01249	2.0695	1.023	399.4	836.6	20.518	7.02	10.49	1759.
46.	.01265	2.0085	.9981	414.7	857.3	20.978	7.10	10.75	1744.
48.	.01281	1.9548	.9725	430.7	879.0	21.441	7.17	10.97	1730.
50.	.01297	1.8968	.9466	447.1	901.2	21.893	7.22	11.19	1715.
52.	.01314	1.8424	.9204	463.7	923.7	22.336	7.26	11.39	1700.
54.	.01332	1.7924	.8941	480.6	946.7	22.769	7.29	11.56	1686.
56.	.01350	1.7490	.8682	497.8	970.2	23.198	7.31	11.71	1673.
58.	.01368	1.7066	.8428	515.0	993.8	23.611	7.32	11.84	1661.
60.	.01387	1.6653	.8179	532.2	1017.6	24.015	7.33	11.96	1649.
65.	.01435	1.5755	.7585	575.8	1078.0	24.981	7.34	12.22	1620.
70.	.01486	1.5009	.7037	619.7	1139.8	25.896	7.35	12.45	1594.
75.	.01538	1.4414	.6533	664.0	1202.5	26.761	7.38	12.63	1571.
80.	.01593	1.3958	.6068	708.5	1266.0	27.582	7.42	12.77	1550.
85.	.01649	1.3528	.5648	753.1	1330.2	28.361	7.48	12.92	1529.
90.	.01706	1.3226	.5269	798.0	1395.2	29.104	7.55	13.05	1512.
95.	.01765	1.2957	.4930	843.1	1460.8	29.813	7.64	13.19	1496.
100.	.01825	1.2775	.4624	888.4	1527.0	30.492	7.74	13.31	1482.
110.	.01947	1.2593	.4096	981.6	1663.0	31.786	8.05	13.60	1459.
120.	.02071	1.2580	.3662	1075.0	1799.7	32.976	8.30	13.78	1445.
140.	.02322	1.2843	.3004	1265.5	2078.2	35.122	8.78	14.09	1435.
160.	.02574	1.3330	.2538	1461.2	2362.1	37.016	9.21	14.34	1440.
180.	.02826	1.3923	.2195	1661.6	2650.7	38.716	9.57	14.55	1455.
200.	.03077	1.4599	.1932	1866.1	2943.1	40.257	9.87	14.71	1475.
220.	.03327	1.5347	.1722	2073.7	3238.2	41.663	10.10	14.81	1500.
240.	.03574	1.6127	.1553	2283.6	3534.6	42.953	10.27	14.86	1527.
260.	.03819	1.6921	.1413	2495.1	3831.7	44.142	10.40	14.87	1555.
280.	.04061	1.7709	.1296	2707.5	4129.0	45.243	10.49	14.87	1584.
300.	.04316	1.8575	.1213	2913.8	4424.4	46.247	10.44	14.87	1626.
350.	.04921	2.0607	.1025	3444.4	5166.6	48.536	10.50	14.82	1705.
400.	.05521	2.2642	.0889	3973.9	5906.1	50.511	10.51	14.76	1783.
450.	.06117	2.4677	.0785	4501.9	6643.0	52.247	10.50	14.71	1859.
500.	.06712	2.6712	.0704	5028.3	7377.5	53.794	10.50	14.68	1933.
550.	.07305	2.8748	.0638	5553.9	8110.6	55.192	10.49	14.65	2003.
600.	.07897	3.0784	.0584	6079.3	8843.2	56.463	10.50	14.55	2072.
650.	.08488	3.2821	.0538	6604.7	9575.5	57.632	10.51	14.65	2138.
700.	.09078	3.4860	.0499	7131.0	10308.5	58.726	10.54	14.67	2202.
750.	.09669	3.6899	.0466	7658.9	11042.9	59.740	10.57	14.70	2265.
800.	.10258	3.8940	.0436	8188.4	11778.8	60.691	10.62	14.74	2325.
850.	.10848	4.0982	.0411	8720.3	12517.2	61.585	10.67	14.79	2383.
900.	.11438	4.3025	.0388	9255.2	13258.3	62.431	10.74	14.85	243 .
950.	.12027	4.5069	.0367	9793.2	14002.6	63.235	10.81	14.92	2494.
1000.	.12616	4.7115	.0349	10334.8	14750.5	64.001	10.90	15.01	2547.
1100.	.13794	5.1208	.0317	11432.2	16260.3	65.430	11.07	15.18	2650.
1200.	.14972	5.5305	.0291	12548.6	17789.0	66.752	11.27	15.38	2747.
1300.	.16150	5.9405	.0268	13685.5	19338.1	67.991	11.48	15.59	2840.
1400.	.17328	6.3507	.0249	14843.5	20908.4	69.162	11.70	15.81	2929.
1500.	.18506	6.7612	.0233	16023.1	22500.2	70.274	11.92	16.03	3015.
1600.	.19684	7.1718	.0218	17223.3	24112.7	71.308	12.14	16.24	3098.
1700.	.20862	7.5827	.0205	18444.9	25746.5	72.294	12.35	16.46	3179.
1800.	.22040	7.9936	.0194	19687.8	27401.8	73.239	12.55	16.66	3258.
2000.	.24397	8.8159	.0174	22237.6	30776.4	75.027	12.96	17.08	3408.
2200.	.26756	9.6385	.0159	24868.1	34232.6	76.667	13.42	17.54	3550.
2400.	.29120	10.4615	.0145	27598.7	37790.8	78.209	13.96	18.12	3684.
2600.	.31497	11.2847	.0134	30458.9	41482.7	79.686	14.67	18.88	3810.
2800.	.33896	12.1081	.0125	33494.4	45357.9	81.127	15.63	19.93	3929.
3000.	.36333	12.9317	.0116	36768.0	49484.4	82.559	16.92	21.37	4041.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

35.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(dH/dV)_P$ KJ/KG	$V(dP/dV)_V$ MPA-CU M/KJ X 10^2	$-V(dP/dV)_T$ MPA	$(dV/dT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 22.715	89.9284	1537.2	.23225	258.2851	.00461	167.31	470.59	.00095	1.29753	1.9916
23.	89.8102	1541.8	.23123	256.9143	.00463	168.63	457.54	.00095	1.29711	1.9371
24.	89.3915	1558.0	.22764	252.0961	.00471	172.79	416.80	.00095	1.29560	1.7718
25.	88.9674	1572.5	.22430	247.2759	.00480	176.28	382.62	.00095	1.29407	1.6373
26.	88.5380	1585.7	.22114	242.4608	.00488	179.13	353.65	.00094	1.29253	1.5275
27.	88.1035	1598.2	.21807	237.6579	.00496	181.46	328.86	.00094	1.29097	1.4366
28.	87.6641	1609.9	.21510	232.8743	.00504	183.37	307.48	.00093	1.28940	1.3606
29.	87.2198	1620.3	.21229	228.1169	.00512	184.90	288.89	.00092	1.28780	1.2962
30.	86.7710	1629.2	.20972	223.3927	.00520	186.10	272.62	.00091	1.28620	1.2408
32.	85.8598	1645.3	.20471	214.0714	.00536	186.31	245.56	.00089	1.28294	1.1616
34.	84.9317	1658.1	.20014	204.9647	.00551	185.84	224.06	.00086	1.27962	1.1019
36.	83.9876	1668.5	.19586	196.1255	.00567	184.88	206.64	.00084	1.27626	1.0565
38.	83.0289	1676.5	.19193	187.6046	.00581	183.51	192.28	.00082	1.27284	1.0214
40.	82.0570	1681.0	.18856	179.4508	.00596	181.84	180.25	.00080	1.26939	.9929
42.	81.0737	1685.2	.18529	171.7099	.00610	179.90	170.04	.00078	1.26590	.9709
44.	80.0660	1699.2	.18204	165.6944	.00618	177.76	161.17	.00076	1.26233	.9514
46.	79.0744	1710.9	.17770	158.8177	.00628	175.62	153.61	.00074	1.25883	.9405
48.	78.0791	1722.4	.17383	152.6322	.00637	173.43	146.99	.00073	1.25532	.9301
50.	77.0835	1728.7	.17016	146.2088	.00647	171.23	141.14	.00071	1.25181	.9225
52.	76.0855	1734.6	.16665	140.1801	.00657	169.03	135.92	.00070	1.24830	.9158
54.	75.0875	1740.6	.16330	134.5895	.00664	166.85	131.23	.00069	1.24480	.9095
56.	74.0914	1747.8	.16023	129.5832	.00670	164.69	126.99	.00068	1.24131	.9029
58.	73.1007	1752.4	.15747	124.7533	.00676	162.59	123.14	.00068	1.23785	.8966
60.	72.1159	1756.2	.15480	120.0965	.00681	160.76	119.63	.00067	1.23441	.8900
65.	69.6848	1769.3	.14839	109.7904	.00691	157.08	112.04	.00066	1.22596	.8719
70.	67.3054	1787.0	.14226	101.0215	.00697	153.53	105.81	.00066	1.21772	.8579
75.	65.0001	1811.6	.13626	93.6896	.00697	150.20	100.64	.00066	1.20977	.8464
80.	62.7793	1844.4	.13032	87.6305	.00692	147.18	96.33	.00066	1.20214	.8359
85.	60.6511	1877.7	.12455	82.0505	.00688	146.89	92.74	.00067	1.19487	.8160
90.	58.6090	1920.3	.11903	77.5149	.00680	146.54	89.75	.00069	1.18791	.7995
95.	56.6637	1964.4	.11388	73.4173	.00672	146.22	87.27	.00070	1.18131	.7873
100.	54.8072	2016.0	.10897	70.0140	.00660	146.03	85.22	.00072	1.17504	.7770
110.	51.3711	2148.8	.09902	64.6923	.00633	150.12	80.16	.00077	1.16348	.7264
120.	48.2939	2286.4	.09139	60.7526	.00603	148.91	78.99	.00081	1.15320	.7311
140.	43.0694	2593.8	.07941	55.3153	.00543	152.36	78.27	.00090	1.13589	.7236
160.	38.8496	2925.1	.07091	51.7872	.00490	157.62	78.90	.00102	1.12203	.7176
180.	35.3863	3265.6	.06479	49.2697	.00446	163.26	80.42	.00114	1.11075	.7167
200.	32.4953	3611.8	.06025	47.4392	.00407	169.21	82.54	.00127	1.10139	.7174
220.	30.0560	3965.0	.05675	46.1257	.00373	175.51	85.07	.00142	1.09354	.7176
240.	27.9774	4317.0	.05403	45.1204	.00344	182.16	87.88	.00158	1.08688	.7168
260.	26.1847	4664.8	.05187	44.3060	.00319	189.05	90.89	.00175	1.08115	.7150
280.	24.6224	5004.1	.05016	43.6041	.00297	196.13	94.03	.00193	1.07619	.7128
300.	23.1706	5275.9	.05013	43.0404	.00282	203.31	97.25	.00212	1.07158	.7111
350.	20.3223	6055.0	.04803	41.8772	.00245	221.42	105.49	.00265	1.06259	.7060
400.	18.1136	6811.6	.04669	41.0123	.00217	239.43	113.81	.00322	1.05566	.7016
450.	16.3468	7554.7	.04576	40.3390	.00195	257.20	122.06	.00385	1.05013	.6980
500.	14.8989	8296.4	.04502	39.7984	.00177	274.71	130.20	.00452	1.04562	.6956
550.	13.6895	9035.2	.04443	39.3544	.00162	292.02	138.20	.00524	1.04186	.6935
600.	12.6634	9777.3	.04391	38.9832	.00150	309.19	146.06	.00600	1.03868	.6919
650.	11.7815	10523.0	.04345	38.6684	.00139	326.28	153.76	.00681	1.03595	.6904
700.	11.0151	11278.2	.04301	38.3982	.00130	343.33	161.33	.00765	1.03359	.6892
750.	10.3427	12042.1	.04259	38.1639	.00122	360.38	168.76	.00854	1.03151	.6882
800.	9.7480	12817.7	.04216	37.9589	.00115	377.46	176.07	.00946	1.02968	.6874
850.	9.2182	13606.7	.04173	37.7781	.00109	394.61	183.26	.01042	1.02805	.6868
900.	8.7431	14410.5	.04129	37.6175	.00103	411.85	190.34	.01142	1.02659	.6864
950.	8.3147	15229.9	.04085	37.4740	.00098	429.18	197.31	.01245	1.02528	.6861
1000.	7.9264	16065.5	.04039	37.3450	.00093	446.62	204.19	.01352	1.02409	.6860
1100.	7.2494	17774.3	.03950	37.1227	.00085	475.56	217.67	.01556	1.02201	.6948
1200.	6.6790	19542.9	.03862	36.9381	.00079	511.00	230.82	.01791	1.02027	.6945
1300.	6.1918	21370.1	.03775	36.7825	.00073	546.89	243.68	.02040	1.01878	.6945
1400.	5.7709	23252.8	.03690	36.6497	.00068	583.16	256.26	.02302	1.01750	.6946
1500.	5.4036	25185.8	.03610	36.5349	.00064	619.74	268.59	.02576	1.01638	.6947
1600.	5.0803	27146.9	.03536	36.4349	.00060	656.17	280.68	.02862	1.01539	.6949
1700.	4.7934	29144.2	.03468	36.3468	.00056	692.71	292.55	.03162	1.01452	.6949
1800.	4.5372	31177.3	.03404	36.2687	.00053	729.46	304.20	.03474	1.01374	.6949
2000.	4.0989	35368.1	.03284	36.1356	.00048	804.64	326.89	.04138	1.01240	.6938
2200.	3.7375	39834.7	.03164	36.0243	.00044	886.22	344.88	.04866	1.01131	.6827
2400.	3.4340	44743.3	.03034	35.9252	.00040	981.01	366.21	.05677	1.01039	.6763
2600.	3.1749	50373.4	.02882	35.8282	.00037	1099.69	387.09	.06604	1.00960	.6646
2800.	2.9502	57095.3	.02704	35.7217	.00035	1256.10	407.63	.07689	1.00892	.6469
3000.	2.7523	65341.6	.02500	35.5924	.00033	1466.36	427.98	.08974	1.00832	.6238

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

40.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 23.746	.01097	3.0705	1.220	263.9	702.6	14.790	5.78	7.16	1951.
24.	.01098	3.0607	1.220	265.3	704.4	14.866	5.81	7.22	1950.
25.	.01103	3.0220	1.218	270.7	711.7	15.164	5.92	7.41	1945.
26.	.01108	2.9829	1.215	276.2	719.2	15.457	6.02	7.60	1941.
27.	.01113	2.9437	1.212	281.9	726.9	15.747	6.11	7.78	1936.
28.	.01118	2.9043	1.208	287.7	734.8	16.032	6.21	7.96	1930.
29.	.01123	2.8648	1.202	293.6	742.8	16.316	6.29	8.14	1925.
30.	.01128	2.8253	1.197	299.7	751.0	16.594	6.37	8.31	1919.
32.	.01139	2.7464	1.183	312.2	768.0	17.141	6.52	8.63	1908.
34.	.01151	2.6681	1.168	325.3	785.6	17.674	6.64	8.95	1895.
36.	.01163	2.5909	1.151	338.7	803.8	18.194	6.76	9.24	1883.
38.	.01175	2.5154	1.132	352.6	822.5	18.702	6.85	9.53	1870.
40.	.01187	2.4420	1.112	366.9	841.9	19.197	6.93	9.78	1857.
42.	.01200	2.3712	1.091	381.5	861.7	19.680	6.99	10.03	1845.
44.	.01214	2.3036	1.070	396.4	882.0	20.152	7.05	10.27	1832.
46.	.01228	2.2396	1.047	411.1	902.2	20.602	7.14	10.53	1818.
48.	.01242	2.2010	1.025	426.7	923.7	21.058	7.20	10.74	1811.
50.	.01257	2.1414	1.001	442.6	945.4	21.500	7.26	10.95	1798.
52.	.01272	2.0954	.9765	458.7	967.4	21.933	7.30	11.13	1787.
54.	.01287	2.0472	.9519	475.0	989.9	22.357	7.34	11.30	1775.
56.	.01303	1.9978	.9274	491.8	1012.9	22.776	7.37	11.46	1763.
58.	.01319	1.9532	.9026	508.5	1035.9	23.181	7.38	11.58	1751.
60.	.01335	1.9092	.8783	525.3	1059.2	23.575	7.39	11.71	1739.
65.	.01377	1.8163	.8195	567.7	1118.4	24.521	7.40	11.96	1713.
70.	.01420	1.7308	.7646	610.6	1178.8	25.417	7.42	12.19	1686.
75.	.01466	1.6626	.7139	653.9	1240.2	26.265	7.45	12.39	1663.
80.	.01513	1.6074	.6672	697.6	1302.6	27.070	7.50	12.56	1641.
85.	.01561	1.5682	.6242	741.6	1365.9	27.837	7.56	12.70	1623.
90.	.01610	1.5299	.5848	785.9	1429.7	28.568	7.63	12.84	1605.
95.	.01660	1.4914	.5491	830.4	1494.3	29.266	7.72	13.01	1585.
100.	.01711	1.4676	.5167	875.4	1559.7	29.936	7.82	13.14	1571.
110.	.01815	1.4337	.4605	968.0	1694.1	31.215	8.13	13.49	1543.
120.	.01922	1.4216	.4137	1061.2	1829.9	32.398	8.37	13.71	1526.
140.	.02139	1.4312	.3413	1252.0	2107.5	34.536	8.85	14.06	1508.
160.	.02357	1.4693	.2892	1448.3	2391.3	36.430	9.28	14.34	1507.
180.	.02576	1.5206	.2505	1649.6	2680.0	38.130	9.63	14.56	1516.
200.	.02794	1.5804	.2207	1855.1	2972.8	39.673	9.92	14.74	1532.
220.	.03012	1.6472	.1971	2063.9	3268.7	41.082	10.16	14.86	1552.
240.	.03228	1.7212	.1778	2275.1	3566.4	42.378	10.33	14.93	1577.
260.	.03442	1.7982	.1617	2488.0	3864.9	43.573	10.47	14.95	1602.
280.	.03654	1.8760	.1482	2701.9	4163.6	44.680	10.56	14.94	1629.
300.	.03877	1.9580	.1386	2907.3	4458.2	45.678	10.48	14.91	1669.
350.	.04407	2.1575	.1171	3439.6	5202.2	47.973	10.53	14.85	1744.
400.	.04932	2.3584	.1015	3970.5	5943.1	49.952	10.53	14.78	1819.
450.	.05454	2.5599	.0897	4499.5	6681.0	51.690	10.52	14.73	1893.
500.	.05974	2.7616	.0804	5026.9	7416.4	53.239	10.52	14.69	1964.
550.	.06492	2.9637	.0729	5553.1	8150.1	54.638	10.51	14.66	2033.
600.	.07010	3.1659	.0667	6079.2	8883.2	55.911	10.52	14.65	2100.
650.	.07527	3.3684	.0614	6605.0	9615.9	57.080	10.53	14.66	2165.
700.	.08044	3.5711	.0570	7131.8	10349.2	58.174	10.55	14.67	2228.
750.	.08560	3.7740	.0532	7659.9	11083.8	59.189	10.59	14.70	2289.
800.	.09076	3.9772	.0498	8189.7	11820.0	60.139	10.63	14.74	2348.
850.	.09591	4.1805	.0469	8722.0	12558.5	61.034	10.68	14.79	2406.
900.	.10107	4.3840	.0442	9257.0	13299.7	61.880	10.75	14.85	2461.
950.	.10622	4.5877	.0419	9795.3	14044.1	62.684	10.82	14.93	2515.
1000.	.11137	4.7915	.0398	10337.1	14792.1	63.451	10.90	15.01	2568.
1100.	.12168	5.1997	.0362	11434.8	16302.0	64.879	11.08	15.18	2669.
1200.	.13198	5.6082	.0332	12551.4	17830.8	66.202	11.28	15.38	2766.
1300.	.14229	6.0173	.0306	13688.4	19379.9	67.441	11.48	15.59	2858.
1400.	.15259	6.4267	.0284	14846.6	20950.2	68.612	11.70	15.81	2946.
1500.	.16289	6.8363	.0265	16026.4	22542.1	69.724	11.93	16.03	3031.
1600.	.17320	7.2463	.0249	17226.7	24154.5	70.758	12.14	16.24	3114.
1700.	.18350	7.6565	.0234	18448.3	25788.3	71.744	12.35	16.45	3194.
1800.	.19380	8.0669	.0221	19691.2	27443.4	72.689	12.56	16.66	3272.
2000.	.21442	8.8881	.0199	22240.7	30817.5	74.477	12.96	17.07	3421.
2200.	.23505	9.7100	.0181	24869.9	34272.0	76.115	13.41	17.53	3563.
2400.	.25574	10.5322	.0166	27596.7	37826.2	77.656	13.94	18.09	3697.
2600.	.27652	11.3548	.0153	30448.5	41509.2	79.129	14.62	18.82	3823.
2800.	.29748	12.1777	.0142	33467.7	45367.1	80.564	15.54	19.82	3941.
3000.	.31876	13.0008	.0133	36712.9	49463.4	81.986	16.75	21.18	4053.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

40.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 23.746	91.1935	1644.6	.23141	280.0107	.00436	178.40	502.49	.00098	1.30209	2.0180
24.	91.0924	1649.4	.23046	278.8086	.00437	179.47	490.21	.00098	1.30173	1.9709
25.	90.6916	1667.0	.22700	274.0675	.00444	183.27	446.98	.00098	1.30028	1.8070
26.	90.2863	1683.3	.22373	269.3192	.00451	186.38	410.60	.00098	1.29882	1.6736
27.	89.8767	1698.7	.22056	264.5703	.00458	188.96	379.68	.00097	1.29735	1.5635
28.	89.4630	1713.2	.21750	259.8275	.00465	191.07	353.17	.00097	1.29586	1.4716
29.	89.0452	1726.4	.21462	255.0973	.00471	192.80	330.25	.00096	1.29435	1.3939
30.	88.6236	1737.9	.21198	250.3862	.00478	194.17	310.30	.00095	1.29284	1.3272
32.	87.7692	1759.0	.20686	241.0461	.00491	194.62	277.37	.00092	1.28977	1.2305
34.	86.9007	1776.2	.20223	231.8569	.00504	194.34	251.47	.00090	1.28666	1.1576
36.	86.0188	1790.6	.19792	222.8662	.00516	193.53	230.66	.00088	1.28350	1.1018
38.	85.1246	1801.9	.19400	214.1198	.00529	192.29	213.65	.00085	1.28031	1.0585
40.	84.2189	1809.0	.19066	205.6614	.00541	190.71	199.52	.00083	1.27708	1.0235
42.	83.3031	1815.2	.18746	197.5321	.00552	188.84	187.62	.00081	1.27382	.9964
44.	82.3785	1821.9	.18420	189.7700	.00564	186.80	177.47	.00080	1.27053	.9755
46.	81.4466	1834.6	.18013	182.4096	.00574	184.66	168.71	.00078	1.26722	.9620
48.	80.4895	1856.0	.17681	177.1544	.00579	182.37	160.96	.00076	1.26383	.9477
50.	79.5574	1864.4	.17331	170.3629	.00587	180.16	154.32	.00074	1.26054	.9380
52.	78.6261	1878.1	.17004	164.7520	.00593	177.95	148.44	.00073	1.25725	.9285
54.	77.6931	1888.1	.16690	159.0507	.00598	175.74	143.19	.00072	1.25396	.9207
56.	76.7649	1894.7	.16400	153.3596	.00605	173.57	138.48	.00071	1.25069	.9142
58.	75.8377	1901.1	.16132	148.1271	.00609	171.43	134.22	.00070	1.24743	.9070
60.	74.9161	1906.3	.15872	143.0324	.00614	169.58	130.34	.00070	1.24420	.8997
65.	72.6362	1925.0	.15242	131.9255	.00621	165.83	122.02	.00069	1.23623	.8799
70.	70.4040	1943.1	.14632	121.8556	.00627	162.20	115.23	.00068	1.22845	.8662
75.	68.2267	1968.9	.14041	113.4349	.00629	158.73	109.56	.00068	1.22090	.8554
80.	66.1148	2001.3	.13462	106.2738	.00628	155.56	104.80	.00067	1.21361	.8465
85.	64.0771	2044.3	.12892	100.4830	.00621	155.22	100.78	.00069	1.20660	.8245
90.	62.1255	2087.6	.12334	95.0470	.00615	154.83	97.40	.00070	1.19991	.8080
95.	60.2513	2128.9	.11808	89.8598	.00611	154.44	94.54	.00071	1.19350	.7964
100.	58.4545	2182.1	.11305	85.7859	.00602	154.17	92.13	.00072	1.18739	.7854
110.	55.0898	2313.2	.10287	78.9795	.00583	157.68	84.07	.00076	1.17599	.7192
120.	52.0300	2450.7	.09499	73.9680	.00559	156.04	82.87	.00079	1.16569	.7278
140.	46.7548	2757.2	.08248	66.9139	.00510	159.88	81.96	.00088	1.14808	.7210
160.	42.4196	3089.8	.07350	62.3257	.00464	165.52	82.32	.00098	1.13374	.7129
180.	38.8206	3431.5	.06698	59.0296	.00424	171.04	83.52	.00109	1.12194	.7110
200.	35.7865	3776.1	.06216	56.5563	.00390	176.49	85.32	.00120	1.11205	.7125
220.	33.2007	4124.4	.05844	54.6870	.00360	182.10	87.56	.00133	1.10367	.7147
240.	30.9777	4477.0	.05553	53.3182	.00333	188.01	90.12	.00146	1.09650	.7155
260.	29.0508	4828.2	.05318	52.2382	.00310	194.20	92.90	.00161	1.09031	.7150
280.	27.3648	5173.8	.05130	51.3371	.00289	200.63	95.85	.00177	1.08492	.7136
300.	25.7922	5430.2	.05129	50.5022	.00275	207.25	98.90	.00194	1.07990	.7113
350.	22.6935	6208.9	.04900	48.9622	.00239	224.29	106.81	.00240	1.07007	.7072
400.	20.2773	6965.1	.04752	47.8225	.00212	241.57	114.89	.00290	1.06245	.7031
450.	18.3361	7708.0	.04648	46.9380	.00191	258.85	122.97	.00345	1.05635	.6996
500.	16.7397	8449.5	.04566	46.2291	.00174	276.02	130.97	.00404	1.05136	.6971
550.	15.4024	9188.1	.04500	45.6475	.00160	293.09	138.87	.00467	1.04719	.6948
600.	14.2650	9929.8	.04443	45.1617	.00148	310.08	146.64	.00534	1.04365	.6930
650.	13.2852	10675.3	.04392	44.7499	.00137	327.03	154.28	.00605	1.04061	.6914
700.	12.4322	11430.3	.04344	44.3967	.00128	343.97	161.79	.00679	1.03797	.6902
750.	11.6826	12194.1	.04298	44.0905	.00121	360.94	169.18	.00757	1.03565	.6890
800.	11.0185	12969.6	.04252	43.8227	.00114	377.96	176.44	.00838	1.03360	.6881
850.	10.4262	13758.6	.04206	43.5867	.00108	395.06	183.60	.00922	1.03177	.6874
900.	9.8944	14562.4	.04160	43.3771	.00102	412.25	190.65	.01010	1.03013	.6869
950.	9.4143	15382.1	.04113	43.1900	.00097	429.54	197.60	.01100	1.02866	.6866
1000.	8.9787	16218.0	.04066	43.0218	.00093	446.95	204.46	.01194	1.02732	.6865
1100.	8.2183	17927.5	.03974	42.7323	.00085	475.56	217.90	.01372	1.02498	.6956
1200.	7.5767	19697.1	.03883	42.4922	.00078	511.00	231.03	.01579	1.02302	.6952
1300.	7.0281	21525.4	.03794	42.2899	.00072	546.88	243.86	.01797	1.02134	.6950
1400.	6.5536	23409.3	.03708	42.1174	.00068	583.16	256.42	.02027	1.01989	.6950
1500.	6.1390	25343.6	.03625	41.9685	.00063	619.74	268.73	.02267	1.01862	.6951
1600.	5.7738	27305.7	.03551	41.8388	.00059	656.15	280.81	.02519	1.01751	.6952
1700.	5.4496	29303.8	.03481	41.7249	.00056	692.67	292.67	.02781	1.01652	.6952
1800.	5.1599	31337.0	.03416	41.6238	.00053	729.38	304.31	.03054	1.01563	.6951
2000.	4.6637	35523.8	.03295	41.4520	.00048	804.31	326.98	.03636	1.01412	.6941
2200.	4.2543	39974.4	.03176	41.3093	.00044	885.18	344.88	.04273	1.01288	.6830
2400.	3.9103	44842.6	.03047	41.1838	.00040	978.33	366.21	.04980	1.01183	.6770
2600.	3.6164	50389.7	.02900	41.0636	.00037	1093.75	387.08	.05786	1.01094	.6660
2800.	3.3615	56962.6	.02727	40.9356	.00035	1244.39	407.61	.06724	1.01016	.6492
3000.	3.1371	64967.4	.02530	40.7851	.00033	1445.38	427.93	.07832	1.00948	.6270

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

45.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 24.742	.01082	3.2640	1.249	271.5	758.6	14.854	5.86	7.25	2009.
25.	.01084	3.2545	1.249	272.9	760.5	14.929	5.89	7.30	2008.
26.	.01088	3.2173	1.247	278.2	767.9	15.218	5.99	7.48	2004.
27.	.01093	3.1798	1.244	283.7	775.5	15.504	6.09	7.66	2000.
28.	.01097	3.1420	1.240	289.3	783.2	15.784	6.19	7.84	1995.
29.	.01102	3.1041	1.235	295.1	791.1	16.063	6.28	8.01	1990.
30.	.01107	3.0660	1.230	301.0	799.2	16.337	6.36	8.17	1985.
32.	.01117	2.9896	1.217	313.1	815.9	16.874	6.51	8.49	1975.
34.	.01127	2.9133	1.203	325.8	833.1	17.398	6.64	8.79	1963.
36.	.01138	2.8375	1.187	338.8	851.0	17.909	6.76	9.08	1952.
38.	.01149	2.7628	1.170	352.3	869.4	18.407	6.86	9.35	1940.
40.	.01161	2.6896	1.151	366.1	888.4	18.893	6.94	9.59	1928.
42.	.01172	2.6182	1.131	380.3	907.8	19.366	7.01	9.83	1916.
44.	.01184	2.5492	1.111	394.8	927.7	19.829	7.07	10.06	1904.
46.	.01197	2.4829	1.090	409.0	947.5	20.269	7.16	10.31	1891.
48.	.01209	2.4198	1.068	424.2	968.4	20.713	7.23	10.54	1878.
50.	.01222	2.3601	1.046	439.6	989.7	21.148	7.29	10.76	1865.
52.	.01236	2.3042	1.023	455.2	1011.4	21.573	7.34	10.95	1854.
54.	.01250	2.2794	1.002	471.2	1033.6	21.993	7.38	11.10	1851.
56.	.01264	2.2290	.9786	487.5	1056.2	22.405	7.41	11.26	1840.
58.	.01278	2.1913	.9554	503.8	1078.9	22.803	7.43	11.37	1832.
60.	.01292	2.1432	.9323	520.2	1101.7	23.190	7.44	11.50	1820.
65.	.01329	2.0456	.8749	561.7	1159.9	24.120	7.46	11.76	1795.
70.	.01368	1.9626	.8202	603.8	1219.3	25.000	7.49	11.98	1772.
75.	.01407	1.8870	.7692	646.3	1279.7	25.833	7.52	12.18	1748.
80.	.01448	1.8198	.7219	689.2	1341.1	26.626	7.57	12.38	1725.
85.	.01491	1.7672	.6782	732.6	1403.4	27.382	7.63	12.55	1705.
90.	.01534	1.7229	.6379	776.3	1466.5	28.104	7.71	12.71	1685.
95.	.01578	1.6938	.6010	820.5	1530.4	28.794	7.79	12.83	1670.
100.	.01622	1.6639	.5671	865.0	1594.9	29.456	7.89	12.98	1654.
110.	.01713	1.6143	.5082	957.0	1727.9	30.721	8.20	13.36	1622.
120.	.01806	1.5871	.4586	1049.8	1862.7	31.895	8.44	13.63	1601.
140.	.01997	1.5823	.3806	1240.5	2139.2	34.025	8.92	14.03	1578.
160.	.02190	1.6082	.3236	1437.4	2422.7	35.916	9.34	14.33	1571.
180.	.02382	1.6518	.2807	1639.3	2711.4	37.617	9.69	14.57	1576.
200.	.02575	1.7050	.2477	1845.5	3004.4	39.161	9.98	14.75	1588.
220.	.02768	1.7654	.2215	2055.2	3300.7	40.572	10.21	14.89	1605.
240.	.02959	1.8336	.2000	2267.5	3599.2	41.871	10.39	14.98	1626.
260.	.03150	1.9071	.1821	2481.6	3898.9	43.072	10.52	15.01	1649.
280.	.03338	1.9838	.1669	2696.8	4198.9	44.183	10.62	15.00	1674.
300.	.03536	2.0602	.1559	2901.6	4492.8	45.177	10.52	14.94	1711.
350.	.04006	2.2557	.1316	3435.5	5238.4	47.477	10.56	14.88	1783.
400.	.04473	2.4537	.1141	3967.6	5980.5	49.459	10.56	14.81	1855.
450.	.04937	2.6528	.1008	4497.7	6719.4	51.199	10.55	14.74	1926.
500.	.05399	2.8526	.0903	5025.9	7455.6	52.750	10.54	14.70	1995.
550.	.05860	3.0529	.0818	5552.8	8189.9	54.150	10.53	14.68	2063.
600.	.06320	3.2536	.0749	6079.4	8923.4	55.423	10.53	14.66	2128.
650.	.06779	3.4547	.0690	6605.8	9656.4	56.593	10.54	14.66	2192.
700.	.07238	3.6562	.0640	7133.0	10390.1	57.688	10.57	14.68	2253.
750.	.07697	3.8579	.0597	7661.5	11124.9	58.703	10.60	14.70	2313.
800.	.08155	4.0600	.0559	8191.6	11861.2	59.654	10.64	14.74	2372.
850.	.08613	4.2623	.0526	8724.1	12599.8	60.549	10.70	14.79	2428.
900.	.09071	4.4649	.0497	9259.3	13341.2	61.395	10.76	14.86	2483.
950.	.09529	4.6678	.0471	9797.8	14085.6	62.199	10.83	14.93	2536.
1000.	.09986	4.8708	.0447	10339.8	14833.6	62.965	10.91	15.01	2588.
1100.	.10902	5.2775	.0406	11437.8	16343.6	64.394	11.09	15.18	2688.
1200.	.11817	5.6849	.0373	12554.7	17872.4	65.716	11.28	15.38	2783.
1300.	.12733	6.0928	.0344	13691.9	19421.6	66.955	11.49	15.59	2875.
1400.	.13648	6.5012	.0320	14850.3	20991.9	68.126	11.71	15.81	2962.
1500.	.14563	6.9100	.0298	16030.1	22583.7	69.239	11.93	16.03	3047.
1600.	.15479	7.3191	.0280	17230.5	24196.1	70.272	12.15	16.24	3128.
1700.	.16395	7.7286	.0263	18452.3	25829.8	71.258	12.36	16.45	3208.
1800.	.17310	8.1383	.0249	19695.2	27484.8	72.203	12.56	16.66	3285.
2000.	.19142	8.9584	.0224	22244.5	30858.5	73.991	12.96	17.07	3434.
2200.	.20976	9.7793	.0204	24872.5	34311.6	75.629	13.40	17.52	3575.
2400.	.22814	10.6007	.0187	27596.2	37862.3	77.168	13.92	18.06	3709.
2600.	.24660	11.4226	.0172	30441.1	41537.9	78.638	14.58	18.77	3834.
2800.	.26521	12.2448	.0160	33446.9	45381.5	80.068	15.45	19.72	3953.
3000.	.28410	13.0674	.0149	36668.5	49452.7	81.481	16.61	21.02	4065.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

45.00 MPA ISOBAR

	TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
	K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
*	24.742	92.3840	1749.4	.23071	301.5396	.00414	188.96	534.95	.00102	1.30639	2.0520
	25.	92.2852	1754.5	.22980	300.3381	.00416	189.95	521.85	.00102	1.30603	2.0046
	26.	91.8995	1773.8	.22639	295.6654	.00422	193.31	476.31	.00101	1.30464	1.8431
	27.	91.5102	1792.2	.22310	290.9811	.00427	196.11	437.86	.00101	1.30323	1.7103
	28.	91.1173	1809.6	.21993	286.2917	.00433	198.43	405.09	.00100	1.30182	1.5998
	29.	90.7211	1825.6	.21695	281.6032	.00439	200.33	376.93	.00099	1.30039	1.5065
	30.	90.3216	1839.6	.21423	276.9220	.00444	201.86	352.54	.00098	1.29895	1.4267
	32.	89.5132	1865.8	.20897	267.6047	.00455	202.52	312.59	.00096	1.29604	1.3100
	34.	88.6930	1887.6	.20423	258.3862	.00466	202.41	281.45	.00093	1.29309	1.2220
	36.	87.8617	1906.2	.19985	249.3110	.00476	201.73	256.65	.00091	1.29010	1.1546
	38.	87.0201	1921.2	.19588	240.4212	.00486	200.58	236.54	.00089	1.28709	1.1021
	40.	86.1687	1931.3	.19252	231.7573	.00497	199.09	219.96	.00087	1.28404	1.0597
	42.	85.3086	1940.0	.18932	223.3571	.00507	197.27	206.09	.00085	1.28097	1.0266
	44.	84.4405	1948.9	.18608	215.2561	.00516	195.27	194.34	.00083	1.27787	1.0011
	46.	83.5657	1963.8	.18205	207.4866	.00525	193.14	184.27	.00081	1.27475	.9841
	48.	82.6853	1975.3	.17853	200.0778	.00534	190.93	175.55	.00079	1.27162	.9695
	50.	81.8007	1985.9	.17525	193.0548	.00542	188.68	167.94	.00077	1.26848	.9574
	52.	80.9135	1995.8	.17216	186.4382	.00549	186.41	161.22	.00076	1.26533	.9472
	54.	80.0086	2020.3	.16959	182.3746	.00549	184.07	155.17	.00075	1.26213	.9356
	56.	79.1301	2028.7	.16683	176.3816	.00555	181.86	149.90	.00074	1.25903	.9278
	58.	78.2527	2041.3	.16436	171.4717	.00557	179.66	145.15	.00073	1.25593	.9189
	60.	77.3824	2046.3	.16195	165.8425	.00562	177.77	140.87	.00072	1.25286	.9116
	65.	75.2269	2068.5	.15584	153.8824	.00569	173.95	131.74	.00071	1.24529	.8907
	70.	73.1119	2095.2	.14983	143.4871	.00572	170.21	124.33	.00070	1.23789	.8748
	75.	71.0481	2123.1	.14392	134.0696	.00574	166.64	118.20	.00069	1.23069	.8640
	80.	69.0373	2153.9	.13814	125.6357	.00575	163.34	113.03	.00069	1.22371	.8563
	85.	67.0851	2193.4	.13247	118.5543	.00572	162.98	108.62	.00070	1.21696	.8362
	90.	65.1997	2238.0	.12692	112.3300	.00568	162.51	104.86	.00071	1.21046	.8201
	95.	63.3895	2293.1	.12164	107.3672	.00560	162.06	101.66	.00072	1.20424	.8051
	100.	61.6472	2347.5	.11656	102.5731	.00553	161.72	98.93	.00073	1.19827	.7940
	110.	58.3738	2477.7	.10620	94.2308	.00539	164.49	87.55	.00076	1.18711	.7113
	120.	55.3571	2611.1	.09815	87.8588	.00522	162.49	86.38	.00078	1.17690	.7245
	140.	50.0760	2920.4	.08524	79.2331	.00480	166.97	85.43	.00086	1.15915	.7179
	160.	45.6714	3253.1	.07588	73.4478	.00441	173.32	85.61	.00095	1.14449	.7079
	180.	41.9732	3597.2	.06902	69.3320	.00405	179.03	86.57	.00105	1.13228	.7043
	200.	38.8312	3942.8	.06393	66.2089	.00374	184.20	88.11	.00116	1.12197	.7056
	220.	36.1318	4289.5	.06003	63.7886	.00347	189.24	90.10	.00127	1.11317	.7090
	240.	33.7920	4639.0	.05697	61.9605	.00323	194.45	92.42	.00138	1.10558	.7118
	260.	31.7500	4990.8	.05450	60.5518	.00301	199.92	94.99	.00151	1.09899	.7131
	280.	29.9569	5341.6	.05246	59.4287	.00281	205.69	97.74	.00165	1.09322	.7129
	300.	28.2816	5585.0	.05240	58.2664	.00268	211.71	100.62	.00180	1.08785	.7101
	350.	24.9599	6363.1	.04994	56.3024	.00234	227.54	108.20	.00221	1.07726	.7075
	400.	22.3557	7119.0	.04832	54.8534	.00208	244.01	116.03	.00265	1.06900	.7041
	450.	20.2547	7861.7	.04718	53.7312	.00188	260.71	123.93	.00314	1.06238	.7008
	500.	18.5211	8602.9	.04627	52.8327	.00171	277.49	131.79	.00367	1.05693	.6983
	550.	17.0646	9341.2	.04554	52.0962	.00157	294.28	139.58	.00423	1.05237	.6961
	600.	15.8228	10082.7	.04492	51.4811	.00145	311.06	147.26	.00483	1.04850	.6942
	650.	14.7509	10827.8	.04437	50.9600	.00135	327.86	154.83	.00546	1.04516	.6924
	700.	13.8159	11582.5	.04384	50.5130	.00127	344.68	162.28	.00612	1.04225	.6911
	750.	12.9929	12346.1	.04335	50.1256	.00119	361.55	169.62	.00681	1.03970	.6898
	800.	12.2628	13121.5	.04286	49.7869	.00112	378.50	176.85	.00754	1.03744	.6888
	850.	11.6106	13910.4	.04238	49.4885	.00106	395.54	183.97	.00829	1.03543	.6881
	900.	11.0245	14714.3	.04190	49.2236	.00101	412.68	190.99	.00907	1.03362	.6875
	950.	10.4947	15534.1	.04141	48.9872	.00096	429.93	197.91	.00988	1.03198	.6871
	1000.	10.0136	16370.2	.04092	48.7748	.00092	447.31	204.74	.01072	1.03050	.6869
	1100.	9.1728	18080.3	.03996	48.4094	.00084	475.56	218.15	.01229	1.02791	.6964
	1200.	8.4622	19850.7	.03903	48.1065	.00077	511.00	231.24	.01414	1.02573	.6958
	1300.	7.8538	21680.0	.03811	47.8516	.00072	546.88	244.05	.01608	1.02387	.6956
	1400.	7.3271	23564.9	.03723	47.6344	.00067	583.16	256.59	.01813	1.02225	.6955
	1500.	6.8665	25500.4	.03640	47.4472	.00063	619.73	268.89	.02027	1.02084	.6955
	1600.	6.4604	27483.4	.03564	47.2842	.00059	656.14	280.95	.02251	1.01960	.6955
	1700.	6.0996	29462.2	.03493	47.1411	.00056	692.65	292.80	.02485	1.01850	.6955
	1800.	5.7769	31495.5	.03427	47.0144	.00053	729.31	304.43	.02728	1.01751	.6954
	2000.	5.2241	35679.1	.03306	46.7994	.00048	804.04	327.08	.03246	1.01583	.6944
	2200.	4.7674	40116.6	.03186	46.6216	.00044	884.32	344.88	.03812	1.01444	.6833
	2400.	4.3834	44951.7	.03060	46.4667	.00040	976.12	366.21	.04439	1.01327	.6776
	2600.	4.0552	50430.2	.02915	46.3210	.00037	1088.83	387.07	.05151	1.01227	.6672
	2800.	3.7705	56879.9	.02747	46.1698	.00035	1234.69	407.59	.05977	1.01141	.6511
	3000.	3.5199	64685.0	.02556	45.9966	.00032	1427.99	427.88	.06949	1.01065	.6298

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

50.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 25.708	.01069	3.4533	1.278	279.2	814.0	14.915	5.94	7.33	2064.
26.	.01071	3.4430	1.278	280.8	816.1	14.997	5.97	7.38	2063.
27.	.01075	3.4072	1.275	286.1	823.6	15.279	6.07	7.56	2060.
28.	.01079	3.3711	1.271	291.6	831.2	15.556	6.17	7.73	2056.
29.	.01084	3.3346	1.267	297.2	839.0	15.831	6.26	7.90	2051.
30.	.01088	3.2980	1.262	302.9	847.0	16.101	6.34	8.06	2047.
32.	.01097	3.2242	1.250	314.7	863.4	16.631	6.50	8.37	2037.
34.	.01107	3.1501	1.236	327.0	880.4	17.147	6.64	8.66	2027.
36.	.01117	3.0761	1.221	339.7	898.0	17.650	6.76	8.94	2016.
38.	.01127	3.0027	1.205	352.8	916.2	18.140	6.87	9.20	2005.
40.	.01137	2.9302	1.187	366.3	934.8	18.618	6.95	9.43	1995.
42.	.01148	2.8590	1.168	380.1	953.9	19.084	7.02	9.66	1984.
44.	.01159	2.7895	1.149	394.2	973.5	19.538	7.09	9.88	1972.
46.	.01170	2.7220	1.129	408.1	992.9	19.971	7.19	10.13	1959.
48.	.01181	2.6570	1.108	422.8	1013.4	20.407	7.26	10.36	1947.
50.	.01193	2.5948	1.087	437.8	1034.4	20.834	7.33	10.57	1934.
52.	.01205	2.5356	1.065	453.1	1055.7	21.252	7.38	10.76	1923.
54.	.01217	2.4797	1.043	468.7	1077.4	21.662	7.43	10.94	1911.
56.	.01230	2.4274	1.021	484.7	1099.7	22.068	7.46	11.10	1900.
58.	.01243	2.4097	1.002	500.6	1122.2	22.464	7.47	11.21	1901.
60.	.01256	2.3577	.9796	516.7	1144.8	22.846	7.49	11.34	1890.
65.	.01290	2.2638	.9248	557.3	1202.1	23.762	7.52	11.60	1869.
70.	.01324	2.1798	.8710	598.6	1260.7	24.630	7.55	11.82	1847.
75.	.01360	2.1048	.8199	640.5	1320.2	25.452	7.59	12.01	1826.
80.	.01396	2.0360	.7723	682.8	1380.8	26.234	7.64	12.20	1804.
85.	.01433	1.9734	.7280	725.6	1442.3	26.980	7.70	12.39	1782.
90.	.01472	1.9221	.6869	768.8	1504.7	27.694	7.78	12.57	1762.
95.	.01511	1.8810	.6489	812.5	1567.9	28.377	7.87	12.72	1744.
100.	.01550	1.8546	.6139	856.7	1631.9	29.033	7.97	12.85	1730.
110.	.01631	1.7960	.5528	948.1	1763.7	30.287	8.27	13.25	1696.
120.	.01714	1.7591	.5009	1040.4	1897.4	31.451	8.51	13.54	1673.
140.	.01883	1.7337	.4184	1231.0	2172.7	33.572	8.98	14.00	1644.
160.	.02055	1.7491	.3569	1428.1	2455.8	35.461	9.40	14.32	1632.
180.	.02228	1.7838	.3103	1630.5	2744.5	37.161	9.75	14.57	1633.
200.	.02400	1.8323	.2740	1837.4	3037.6	38.705	10.03	14.76	1642.
220.	.02573	1.8865	.2453	2047.7	3334.0	40.118	10.26	14.91	1655.
240.	.02744	1.9485	.2218	2260.8	3633.0	41.419	10.44	15.01	1673.
260.	.02916	2.0170	.2022	2475.8	3933.6	42.622	10.58	15.06	1695.
280.	.03085	2.0909	.1856	2692.1	4234.8	43.738	10.68	15.07	1718.
300.	.03263	2.1638	.1730	2896.6	4528.0	44.728	10.55	14.97	1752.
350.	.03686	2.3550	.1461	3431.9	5275.0	47.033	10.59	14.90	1820.
400.	.04106	2.5498	.1266	3965.3	6018.3	49.018	10.59	14.83	1890.
450.	.04523	2.7463	.1118	4496.4	6758.1	50.760	10.57	14.76	1958.
500.	.04939	2.9440	.1002	5025.4	7494.9	52.312	10.56	14.72	2026.
550.	.05354	3.1424	.0908	5553.0	8229.8	53.714	10.55	14.68	2091.
600.	.05767	3.3414	.0830	6080.1	8963.8	54.988	10.55	14.67	2155.
650.	.06180	3.5410	.0765	6606.9	9697.1	56.158	10.56	14.67	2218.
700.	.06593	3.7411	.0710	7134.5	10431.0	57.253	10.58	14.68	2278.
750.	.07005	3.9416	.0662	7663.4	11166.0	58.268	10.61	14.71	2337.
800.	.07417	4.1425	.0620	8193.8	11902.4	59.219	10.66	14.75	2394.
850.	.07829	4.3437	.0584	8726.6	12641.2	60.114	10.71	14.80	2450.
900.	.08241	4.5453	.0551	9262.1	13382.6	60.961	10.77	14.86	2504.
950.	.08653	4.7472	.0522	9800.7	14127.1	61.765	10.84	14.93	2556.
1000.	.09065	4.9494	.0496	10342.9	14875.2	62.531	10.92	15.01	2608.
1100.	.09888	5.3545	.0451	11441.2	16385.2	63.960	11.10	15.18	2706.
1200.	.10711	5.7604	.0413	12558.4	17914.0	65.282	11.29	15.38	2801.
1300.	.11535	6.1670	.0382	13695.8	19463.1	66.522	11.50	15.59	2891.
1400.	.12358	6.5743	.0354	14854.4	21033.4	67.693	11.72	15.81	2978.
1500.	.13182	6.9821	.0331	16034.4	22625.2	68.805	11.94	16.03	3061.
1600.	.14005	7.3904	.0310	17234.9	24237.5	69.838	12.15	16.24	3143.
1700.	.14829	7.7990	.0292	18456.7	25871.2	70.824	12.36	16.45	3222.
1800.	.15653	8.2080	.0276	19699.7	27526.1	71.769	12.57	16.66	3299.
2000.	.17301	9.0268	.0248	22248.8	30899.3	73.557	12.97	17.07	3447.
2200.	.18951	9.8465	.0226	24875.9	34351.2	75.194	13.40	17.51	3587.
2400.	.20604	10.6670	.0207	27597.0	37899.0	76.732	13.91	18.04	3720.
2600.	.22264	11.4881	.0191	30436.0	41568.2	78.200	14.55	18.72	3845.
2800.	.23938	12.3096	.0178	33430.5	45399.7	79.624	15.39	19.64	3964.
3000.	.25635	13.1315	.0166	36632.2	49449.7	81.030	16.50	20.88	4076.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

50.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 25.708	93.5095	1851.7	.23018	322.9196	.00396	198.99	567.99	.00105	1.31046	2.0922
26.	93.4012	1858.0	.22917	321.5761	.00397	199.97	552.43	.00104	1.31007	2.0392
27.	93.0286	1879.3	.22574	316.9646	.00402	202.99	504.76	.00104	1.30872	1.8795
28.	92.6530	1899.6	.22244	312.3381	.00407	205.49	464.37	.00103	1.30736	1.7471
29.	92.2745	1918.3	.21935	307.7025	.00412	207.56	429.87	.00103	1.30600	1.6356
30.	91.8933	1935.1	.21652	303.0638	.00416	209.24	400.14	.00102	1.30462	1.5406
32.	91.1229	1966.3	.21109	293.8000	.00425	210.09	351.80	.00099	1.30184	1.4009
34.	90.3427	1992.9	.20621	284.5909	.00434	210.12	314.46	.00097	1.29902	1.2956
36.	89.5533	2015.8	.20172	275.4789	.00443	209.56	284.97	.00094	1.29618	1.2150
38.	88.7551	2034.7	.19767	266.5040	.00452	208.49	261.23	.00092	1.29331	1.1522
40.	87.9489	2048.1	.19426	257.7042	.00461	207.06	241.80	.00090	1.29042	1.1015
42.	87.1352	2059.8	.19102	249.1153	.00469	205.28	225.65	.00088	1.28750	1.0618
44.	86.3146	2071.2	.18777	240.7706	.00477	203.30	212.06	.00086	1.28456	1.0309
46.	85.4880	2088.9	.18373	232.7010	.00485	201.19	200.49	.00084	1.28161	1.0097
48.	84.6562	2102.6	.18022	224.9347	.00493	198.98	190.53	.00082	1.27864	.9917
50.	83.8203	2114.6	.17696	217.4956	.00500	196.71	181.87	.00080	1.27566	.9770
52.	82.9812	2125.6	.17390	210.4081	.00506	194.42	174.28	.00078	1.27267	.9646
54.	82.1403	2135.6	.17104	203.6869	.00512	192.11	167.58	.00077	1.26969	.9541
56.	81.2989	2144.7	.16841	197.3461	.00517	189.82	161.62	.00076	1.25670	.9448
58.	80.4310	2168.3	.16667	193.8173	.00517	187.45	156.13	.00075	1.26363	.9335
60.	79.6003	2173.0	.16434	187.6705	.00522	185.50	151.37	.00074	1.26069	.9256
65.	77.5440	2202.2	.15863	175.5411	.00527	181.57	141.30	.00073	1.25343	.9029
70.	75.5271	2234.0	.15279	164.6374	.00529	177.73	133.23	.00072	1.24634	.8860
75.	73.5548	2268.5	.14694	154.8164	.00530	174.03	126.58	.00071	1.23944	.8738
80.	71.6309	2304.7	.14118	145.8433	.00530	170.61	121.00	.00070	1.23272	.8655
85.	69.7620	2343.5	.13549	137.6651	.00529	170.24	116.25	.00071	1.22622	.8462
90.	67.9453	2389.4	.12991	130.5979	.00526	169.74	112.16	.00072	1.21993	.8305
95.	66.1884	2441.1	.12460	124.5019	.00521	169.22	108.64	.00072	1.21386	.8168
100.	64.4956	2504.1	.11948	119.6114	.00513	168.82	105.61	.00073	1.20803	.8040
110.	61.3053	2638.9	.10904	110.1069	.00502	170.66	90.67	.00076	1.19710	.7038
120.	58.3468	2773.5	.10091	102.6367	.00488	168.35	89.59	.00077	1.18702	.7203
140.	53.0937	3079.6	.08772	92.0502	.00455	173.67	88.69	.00084	1.16927	.7148
160.	48.6518	3415.0	.07804	85.0971	.00419	181.00	88.78	.00094	1.15439	.7025
180.	44.8845	3760.1	.07090	80.0658	.00388	187.20	89.56	.00103	1.14188	.6971
200.	41.6582	4110.1	.06557	76.3289	.00359	192.31	90.88	.00113	1.13124	.6973
220.	38.8704	4456.4	.06149	73.3272	.00335	196.92	92.65	.00122	1.12210	.7013
240.	36.4373	4803.0	.05831	70.9973	.00312	201.49	94.75	.00133	1.11416	.7057
260.	34.2992	5151.6	.05574	69.1826	.00292	206.26	97.12	.00144	1.10722	.7091
280.	32.4108	5502.7	.05362	67.7689	.00274	211.33	99.69	.00156	1.10112	.7107
300.	30.6495	5739.9	.05347	66.3210	.00261	216.71	102.41	.00170	1.09544	.7075
350.	27.1292	6517.4	.05084	63.8894	.00229	231.22	109.66	.00206	1.08417	.7068
400.	24.3547	7273.1	.04909	62.0985	.00204	246.76	117.24	.00246	1.07534	.7045
450.	22.1071	8015.4	.04785	60.7131	.00184	262.82	124.94	.00290	1.06822	.7017
500.	20.2464	8756.5	.04686	59.6048	.00168	279.15	132.66	.00337	1.06235	.6993
550.	18.6789	9494.5	.04607	58.6964	.00155	295.61	140.33	.00388	1.05743	.6971
600.	17.3392	10235.6	.04539	57.9379	.00143	312.16	147.92	.00442	1.05323	.6952
650.	16.1804	10980.5	.04479	57.2953	.00134	328.78	155.41	.00499	1.04961	.6934
700.	15.1678	11734.9	.04423	56.7441	.00125	345.46	162.80	.00558	1.04646	.6919
750.	14.2751	12498.2	.04370	56.2665	.00118	362.23	170.09	.00621	1.04368	.6906
800.	13.4820	13273.5	.04319	55.8489	.00111	379.09	177.27	.00686	1.04122	.6895
850.	12.7726	14062.3	.04268	55.4809	.00105	396.06	184.35	.00754	1.03902	.6887
900.	12.1343	14866.2	.04217	55.1545	.00100	413.14	191.34	.00825	1.03704	.6881
950.	11.5569	15686.0	.04166	54.8631	.00095	430.35	198.24	.00898	1.03526	.6876
1000.	11.0320	16522.3	.04115	54.6014	.00091	447.69	205.04	.00973	1.03364	.6874
1100.	10.1133	18232.8	.04017	54.1514	.00083	475.56	218.41	.01115	1.03081	.6973
1200.	9.3359	20003.8	.03921	53.7787	.00077	511.00	231.47	.01281	1.02842	.6965
1300.	8.6695	21833.9	.03828	53.4653	.00071	546.88	244.25	.01457	1.02637	.6961
1400.	8.0919	23719.9	.03738	53.1985	.00067	583.15	256.77	.01641	1.02460	.6959
1500.	7.5863	25656.2	.03653	52.9686	.00062	619.73	269.05	.01835	1.02305	.6959
1600.	7.1402	27620.2	.03576	52.7687	.00059	656.13	281.10	.02037	1.02168	.6959
1700.	6.7436	29619.5	.03505	52.5934	.00056	692.62	292.93	.02247	1.02047	.6958
1800.	6.3887	31652.9	.03438	52.4382	.00053	729.25	304.56	.02467	1.01938	.6957
2000.	5.7801	35833.8	.03315	52.1754	.00048	803.80	327.19	.02934	1.01752	.6947
2200.	5.2769	40260.4	.03196	51.9590	.00043	883.59	344.88	.03443	1.01599	.6835
2400.	4.8535	45067.5	.03070	51.7719	.00040	974.24	366.21	.04006	1.01470	.6781
2600.	4.4915	50488.2	.02929	51.5984	.00037	1084.67	387.07	.04643	1.01360	.6681
2800.	4.1774	56833.8	.02765	51.4221	.00035	1226.48	407.57	.05381	1.01264	.6528
3000.	3.9009	64470.2	.02578	51.2248	.00032	1413.28	427.84	.06246	1.01180	.6322

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

55.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 26.646	.01057	3.6392	1.307	287.1	868.6	14.972	6.01	7.41	2118.
27.	.01059	3.6271	1.305	289.0	871.3	15.070	6.05	7.47	2117.
28.	.01063	3.5926	1.302	294.3	878.8	15.344	6.15	7.64	2113.
29.	.01067	3.5577	1.298	299.7	886.6	15.616	6.24	7.81	2109.
30.	.01071	3.5225	1.293	305.3	894.4	15.883	6.33	7.96	2105.
32.	.01080	3.4514	1.282	316.8	910.7	16.406	6.49	8.26	2097.
34.	.01088	3.3796	1.268	328.8	927.5	16.916	6.63	8.55	2087.
36.	.01097	3.3076	1.254	341.2	944.8	17.412	6.76	8.82	2077.
38.	.01107	3.2357	1.238	354.1	962.7	17.896	6.87	9.07	2067.
40.	.01116	3.1643	1.221	367.2	981.1	18.367	6.95	9.30	2057.
42.	.01126	3.0937	1.203	380.7	999.9	18.826	7.03	9.52	2047.
44.	.01136	3.0244	1.184	394.4	1019.2	19.274	7.10	9.74	2036.
46.	.01146	2.9566	1.165	408.0	1038.4	19.700	7.21	9.98	2023.
48.	.01157	2.8906	1.145	422.4	1058.5	20.129	7.29	10.20	2011.
50.	.01167	2.8269	1.125	437.1	1079.1	20.550	7.35	10.40	2000.
52.	.01178	2.7656	1.104	452.1	1100.1	20.961	7.41	10.59	1988.
54.	.01189	2.7071	1.083	467.3	1121.5	21.365	7.46	10.77	1977.
56.	.01201	2.6515	1.061	483.0	1143.5	21.765	7.50	10.93	1966.
58.	.01213	2.5990	1.040	498.5	1165.5	22.151	7.52	11.07	1956.
60.	.01224	2.5499	1.018	514.3	1187.7	22.528	7.54	11.19	1946.
65.	.01255	2.4754	.9691	554.2	1244.7	23.439	7.57	11.46	1935.
70.	.01287	2.3895	.9170	594.9	1302.6	24.297	7.61	11.68	1916.
75.	.01319	2.3173	.8665	636.1	1361.6	25.111	7.65	11.87	1897.
80.	.01352	2.2438	.8187	677.9	1421.4	25.884	7.70	12.07	1875.
85.	.01386	2.1803	.7743	720.1	1482.2	26.621	7.77	12.26	1855.
90.	.01420	2.1219	.7327	762.9	1543.9	27.327	7.85	12.44	1834.
95.	.01455	2.0737	.6939	806.2	1606.6	28.004	7.94	12.61	1815.
100.	.01491	2.0336	.6579	850.0	1670.0	28.655	8.04	12.77	1797.
110.	.01564	1.9786	.5940	940.9	1801.0	29.901	8.34	13.14	1765.
120.	.01638	1.9310	.5405	1032.8	1933.7	31.056	8.58	13.45	1740.
140.	.01790	1.8884	.4545	1222.9	2207.6	33.166	9.05	13.96	1707.
160.	.01945	1.8907	.3891	1420.2	2490.1	35.051	9.45	14.31	1691.
180.	.02102	1.9181	.3390	1623.0	2778.9	36.751	9.81	14.57	1688.
200.	.02257	1.9596	.2998	1830.4	3072.0	38.295	10.09	14.76	1693.
220.	.02413	2.0095	.2685	2041.3	3368.6	39.709	10.32	14.91	1704.
240.	.02569	2.0648	.2431	2255.0	3667.8	41.011	10.49	15.03	1720.
260.	.02724	2.1280	.2220	2470.7	3968.9	42.216	10.63	15.09	1738.
280.	.02878	2.1975	.2039	2687.9	4270.9	43.335	10.73	15.12	1760.
300.	.03039	2.2687	.1899	2892.3	4563.7	44.323	10.59	15.00	1792.
350.	.03424	2.4553	.1605	3428.9	5311.9	46.631	10.62	14.93	1857.
400.	.03805	2.6466	.1390	3963.4	6056.3	48.619	10.62	14.85	1924.
450.	.04185	2.8404	.1228	4495.4	6796.9	50.363	10.59	14.77	1990.
500.	.04562	3.0358	.1100	5025.2	7534.5	51.917	10.58	14.73	2056.
550.	.04939	3.2322	.0997	5553.5	8269.8	53.319	10.57	14.69	2120.
600.	.05315	3.4294	.0912	6081.2	9004.2	54.594	10.57	14.68	2182.
650.	.05690	3.6274	.0840	6608.5	9737.8	55.765	10.58	14.67	2243.
700.	.06065	3.8259	.0779	7136.5	10472.0	56.860	10.60	14.69	2302.
750.	.06439	4.0251	.0727	7665.7	11207.1	57.876	10.63	14.71	2360.
800.	.06813	4.2247	.0681	8196.4	11943.7	58.827	10.67	14.75	2416.
850.	.07187	4.4247	.0641	8729.5	12682.6	59.722	10.72	14.80	2471.
900.	.07562	4.6252	.0605	9265.2	13424.1	60.568	10.78	14.86	2524.
950.	.07936	4.8261	.0573	9804.1	14168.6	61.372	10.86	14.93	2576.
1000.	.08310	5.0272	.0545	10346.4	14916.7	62.139	10.94	15.01	2627.
1100.	.09058	5.4306	.0495	11445.1	16426.7	63.568	11.11	15.18	2724.
1200.	.09805	5.8349	.0454	12562.5	17955.5	64.890	11.30	15.38	2818.
1300.	.10554	6.2402	.0419	13700.2	19504.6	66.129	11.51	15.59	2907.
1400.	.11302	6.6462	.0389	14858.9	21074.8	67.300	11.73	15.80	2993.
1500.	.12050	7.0529	.0363	16039.1	22666.6	68.412	11.95	16.03	3076.
1600.	.12798	7.4601	.0341	17239.8	24278.8	69.446	12.16	16.24	3157.
1700.	.13547	7.8678	.0321	18461.7	25912.4	70.432	12.37	16.45	3235.
1800.	.14295	8.2760	.0303	19704.7	27567.1	71.377	12.57	16.66	3311.
2000.	.15793	9.0933	.0273	22253.7	30939.9	73.164	12.97	17.06	3459.
2200.	.17292	9.9118	.0248	24880.0	34390.8	74.800	13.40	17.50	3598.
2400.	.18795	10.7312	.0228	27599.0	37936.0	76.337	13.89	18.02	3731.
2600.	.20303	11.5513	.0210	30433.0	41599.8	77.803	14.52	18.69	3856.
2800.	.21824	12.3721	.0195	33417.7	45420.8	79.224	15.33	19.37	3974.
3000.	.23364	13.1933	.0182	36602.2	49452.5	80.624	16.40	20.77	4087.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

55.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 26.646	94.5778	1952.1	.22975	344.1862	.00380	208.55	601.68	.00107	1.31434	2.1378
27.	94.4505	1960.6	.22849	342.5778	.00381	209.63	581.97	.00107	1.31388	2.0742
28.	94.0893	1983.8	.22505	338.0217	.00385	212.31	532.32	.00106	1.31257	1.9159
29.	93.7257	2005.4	.22183	333.4476	.00389	214.54	490.14	.00106	1.31125	1.7832
30.	93.3597	2024.8	.21889	328.8612	.00393	216.36	454.00	.00105	1.30992	1.6705
32.	92.6212	2061.2	.21326	319.6741	.00401	217.38	395.65	.00102	1.30725	1.5040
34.	91.8746	2092.5	.20822	310.5035	.00409	217.54	350.98	.00100	1.30455	1.3791
36.	91.1202	2119.9	.20360	301.3902	.00416	217.08	315.99	.00097	1.30183	1.2836
38.	90.3586	2142.8	.19945	292.3729	.00423	216.08	288.03	.00095	1.29908	1.2092
40.	89.5903	2159.8	.19596	283.4879	.00431	214.69	265.29	.00093	1.29631	1.1492
42.	88.8157	2174.6	.19266	274.7696	.00438	212.94	246.52	.00091	1.29353	1.1020
44.	88.0353	2189.0	.18936	266.2499	.00445	210.98	230.82	.00089	1.29073	1.0651
46.	87.2498	2209.8	.18529	257.9587	.00452	208.86	217.52	.00086	1.28791	1.0392
48.	86.4597	2225.9	.18177	249.9233	.00458	206.65	206.14	.00084	1.28508	1.0173
50.	85.6657	2240.1	.17850	242.1683	.00464	204.36	196.31	.00083	1.28224	.9993
52.	84.8687	2252.7	.17544	234.7155	.00470	202.04	187.73	.00081	1.27940	.9844
54.	84.0695	2264.0	.17259	227.5835	.00476	199.71	180.19	.00079	1.27655	.9718
56.	83.2691	2273.7	.16998	220.7875	.00481	197.38	173.51	.00078	1.27370	.9608
58.	82.4687	2281.4	.16767	214.3387	.00485	195.06	167.55	.00077	1.27085	.9507
60.	81.6692	2289.4	.16542	208.2446	.00489	193.03	162.21	.00076	1.26801	.9406
65.	79.6560	2330.9	.16072	197.1767	.00491	188.84	150.86	.00074	1.26088	.9151
70.	77.7140	2366.1	.15514	185.6980	.00494	184.85	142.00	.00073	1.25403	.8975
75.	75.8132	2407.7	.14946	175.6818	.00493	181.00	134.76	.00072	1.24735	.8842
80.	73.9677	2446.5	.14374	165.9722	.00493	177.46	128.76	.00072	1.24088	.8756
85.	72.1689	2490.6	.13811	157.3462	.00492	177.09	123.66	.00072	1.23460	.8558
90.	70.4197	2537.4	.13254	149.4223	.00490	176.57	119.28	.00073	1.22851	.8406
95.	68.7183	2589.9	.12717	142.5027	.00487	176.00	115.48	.00073	1.22261	.8274
100.	67.0733	2647.9	.12198	136.4020	.00482	175.54	112.18	.00074	1.21691	.8161
110.	63.9504	2798.4	.11136	126.5290	.00469	176.28	93.47	.00076	1.20616	.6966
120.	61.0551	2933.1	.10322	117.8980	.00458	173.70	92.51	.00076	1.19625	.7161
140.	55.8554	3238.9	.08993	105.4773	.00431	179.99	91.74	.00083	1.17858	.7113
160.	51.4027	3574.5	.08000	97.1866	.00400	188.57	91.81	.00092	1.16359	.6967
180.	47.5849	3923.3	.07262	91.2726	.00371	195.53	92.48	.00102	1.15084	.6891
200.	44.2982	4274.9	.06708	86.8068	.00345	200.82	93.63	.00111	1.13994	.6883
220.	41.4370	4624.8	.06281	83.2688	.00322	205.15	95.20	.00120	1.13051	.6921
240.	38.9298	4967.9	.05952	80.3804	.00302	209.16	97.11	.00129	1.12229	.6976
260.	36.7130	5312.9	.05688	78.1244	.00284	213.25	99.29	.00139	1.11506	.7028
280.	34.7442	5660.3	.05471	76.3489	.00267	217.61	101.69	.00149	1.10866	.7065
300.	32.9061	5894.4	.05450	74.6540	.00254	222.30	104.25	.00162	1.10272	.7033
350.	29.2084	6671.6	.05170	71.7146	.00224	235.38	111.17	.00194	1.09082	.7050
400.	26.2794	7427.0	.04984	69.5512	.00200	249.87	118.50	.00231	1.08146	.7040
450.	23.8972	8169.1	.04849	67.8786	.00181	265.21	126.01	.00270	1.07388	.7020
500.	21.9189	8910.1	.04743	66.5409	.00165	281.02	133.57	.00313	1.06762	.7000
550.	20.2477	9647.8	.04657	65.4444	.00152	297.11	141.12	.00360	1.06236	.6979
600.	18.8162	10388.7	.04584	64.5288	.00141	313.38	148.61	.00409	1.05786	.6960
650.	17.5755	11133.2	.04520	63.7529	.00132	329.79	156.03	.00460	1.05397	.6942
700.	16.4894	11887.4	.04460	63.0873	.00124	346.32	163.35	.00515	1.05058	.6927
750.	15.5303	12650.5	.04404	62.5104	.00116	362.97	170.58	.00572	1.04759	.6914
800.	14.6771	13425.5	.04350	62.0060	.00110	379.74	177.72	.00632	1.04493	.6902
850.	13.9131	14214.3	.04296	61.5616	.00104	396.63	184.76	.00694	1.04256	.6893
900.	13.2248	15018.1	.04243	61.1673	.00099	413.65	191.72	.00758	1.04042	.6886
950.	12.6015	15837.9	.04191	60.8154	.00094	430.80	198.58	.00824	1.03849	.6882
1000.	12.0343	16674.3	.04138	60.4995	.00090	448.09	205.36	.00893	1.03674	.6879
1100.	11.0405	18385.1	.04037	59.9563	.00083	475.56	218.69	.01021	1.03367	.6981
1200.	10.1984	20156.6	.03938	59.5066	.00076	511.00	231.71	.01173	1.03107	.6972
1300.	9.4755	21987.4	.03843	59.1289	.00071	546.88	244.47	.01333	1.02884	.6967
1400.	8.8483	23874.1	.03752	58.8073	.00066	583.15	256.97	.01501	1.02692	.6964
1500.	8.2988	25811.4	.03665	58.5307	.00062	619.73	269.23	.01677	1.02523	.6963
1600.	7.8136	27776.0	.03587	58.2902	.00058	656.12	281.26	.01861	1.02374	.6962
1700.	7.3819	29775.8	.03515	58.0794	.00055	692.60	293.08	.02053	1.02242	.6962
1800.	6.9953	31809.4	.03447	57.8931	.00052	729.20	304.69	.02253	1.02124	.6960
2000.	6.3319	35987.9	.03324	57.5781	.00047	803.60	327.30	.02678	1.01921	.6949
2200.	5.7829	40405.1	.03204	57.3195	.00043	882.96	344.88	.03141	1.01753	.6836
2400.	5.3207	45188.1	.03080	57.0975	.00040	972.62	366.20	.03652	1.01612	.6785
2600.	4.9253	50559.1	.02941	56.8939	.00037	1081.08	387.06	.04229	1.01492	.6690
2800.	4.5822	56815.3	.02781	56.6907	.00034	1219.42	407.55	.04894	1.01387	.6542
3000.	4.2801	64306.6	.02598	56.4680	.00032	1400.61	427.81	.05673	1.01296	.6343

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

60.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 27.559	.01046	3.8220	1.334	295.1	922.7	15.027	6.09	7.49	2169.
28.	.01048	3.8074	1.333	297.4	926.0	15.146	6.13	7.56	2167.
29.	.01052	3.7741	1.329	302.7	933.7	15.415	6.23	7.73	2164.
30.	.01056	3.7404	1.324	308.2	941.5	15.679	6.31	7.88	2161.
32.	.01064	3.6720	1.313	319.4	957.5	16.197	6.48	8.18	2153.
34.	.01072	3.6026	1.300	331.1	974.2	16.701	6.62	8.46	2144.
36.	.01080	3.5327	1.285	343.3	991.3	17.192	6.76	8.72	2135.
38.	.01089	3.4625	1.270	355.8	1009.0	17.671	6.87	8.97	2126.
40.	.01098	3.3924	1.253	368.7	1027.2	18.136	6.96	9.19	2116.
42.	.01107	3.3228	1.236	381.9	1045.8	18.589	7.04	9.40	2107.
44.	.01116	3.2541	1.217	395.4	1064.8	19.031	7.12	9.61	2096.
46.	.01125	3.1864	1.199	408.6	1083.7	19.452	7.22	9.85	2084.
48.	.01135	3.1202	1.180	422.8	1103.6	19.875	7.30	10.06	2073.
50.	.01145	3.0557	1.160	437.2	1124.0	20.290	7.38	10.26	2062.
52.	.01155	2.9932	1.140	451.9	1144.7	20.696	7.44	10.45	2050.
54.	.01165	2.9329	1.119	466.8	1165.7	21.094	7.49	10.62	2039.
56.	.01175	2.8751	1.099	482.2	1187.4	21.489	7.53	10.78	2028.
58.	.01186	2.8199	1.078	497.5	1209.1	21.870	7.56	10.92	2018.
60.	.01197	2.7676	1.057	513.0	1231.1	22.242	7.58	11.05	2008.
65.	.01225	2.6498	1.004	552.2	1287.0	23.137	7.62	11.33	1985.
70.	.01254	2.5870	.9585	592.2	1344.8	23.993	7.66	11.57	1977.
75.	.01284	2.5083	.9089	632.9	1403.2	24.799	7.71	11.78	1958.
80.	.01314	2.4474	.8616	674.2	1462.6	25.565	7.76	11.95	1941.
85.	.01345	2.3784	.8168	716.0	1522.8	26.296	7.83	12.14	1920.
90.	.01376	2.3204	.7751	758.3	1584.0	26.996	7.92	12.33	1901.
95.	.01408	2.2690	.7361	801.3	1646.1	27.667	8.01	12.50	1882.
100.	.01440	2.2209	.6994	844.8	1709.0	28.312	8.11	12.68	1863.
110.	.01507	2.1497	.6333	935.2	1839.1	29.550	8.41	13.07	1827.
120.	.01574	2.1021	.5771	1026.7	1971.1	30.699	8.65	13.36	1802.
140.	.01712	2.0411	.4886	1216.3	2243.6	32.799	9.11	13.91	1765.
160.	.01854	2.0338	.4201	1413.5	2525.7	34.680	9.52	14.29	1747.
180.	.01996	2.0523	.3668	1616.6	2814.1	36.378	9.87	14.57	1741.
200.	.02138	2.0865	.3249	1824.4	3107.3	37.923	10.15	14.77	1743.
220.	.02280	2.1322	.2912	2035.9	3404.0	39.337	10.37	14.92	1752.
240.	.02422	2.1830	.2638	2250.1	3703.4	40.640	10.54	15.03	1764.
260.	.02564	2.2398	.2411	2466.4	4004.7	41.846	10.68	15.11	1780.
280.	.02705	2.3043	.2218	2684.2	4307.3	42.967	10.78	15.15	1800.
300.	.02852	2.3746	.2067	2888.5	4599.9	43.953	10.63	15.02	1832.
350.	.03205	2.5564	.1747	3426.4	5349.2	46.264	10.66	14.95	1894.
400.	.03554	2.7441	.1514	3961.9	6094.5	48.255	10.64	14.86	1958.
450.	.03902	2.9351	.1337	4494.8	6836.0	50.001	10.62	14.79	2022.
500.	.04248	3.1280	.1197	5025.4	7574.1	51.556	10.60	14.74	2085.
550.	.04593	3.3222	.1085	5554.3	8310.0	52.959	10.59	14.70	2148.
600.	.04937	3.5175	.0992	6082.6	9044.7	54.235	10.59	14.68	2209.
650.	.05280	3.7137	.0915	6610.4	9778.6	55.406	10.60	14.68	2268.
700.	.05624	3.9107	.0848	7138.8	10513.0	56.501	10.61	14.69	2326.
750.	.05967	4.1083	.0791	7668.3	11248.3	57.517	10.64	14.71	2383.
800.	.06309	4.3066	.0741	8199.4	11985.0	58.469	10.68	14.75	2438.
850.	.06652	4.5053	.0698	8732.7	12723.9	59.364	10.74	14.80	2492.
900.	.06995	4.7046	.0659	9268.7	13465.5	60.211	10.80	14.86	2545.
950.	.07337	4.9043	.0624	9807.8	14210.1	61.015	10.87	14.93	2596.
1000.	.07680	5.1045	.0593	10350.4	14958.2	61.781	10.95	15.01	2645.
1100.	.08365	5.5058	.0539	11449.4	16468.2	63.210	11.12	15.18	2742.
1200.	.09050	5.9085	.0494	12567.1	17997.0	64.532	11.31	15.38	2834.
1300.	.09735	6.3122	.0456	13705.0	19546.0	65.771	11.52	15.59	2922.
1400.	.10420	6.7169	.0424	14863.9	21116.1	66.942	11.74	15.80	3007.
1500.	.11106	7.1223	.0396	16044.3	22707.8	68.054	11.96	16.03	3090.
1600.	.11791	7.5284	.0371	17245.1	24319.9	69.088	12.17	16.24	3170.
1700.	.12477	7.9351	.0350	18467.1	25953.4	70.074	12.38	16.45	3248.
1800.	.13163	8.3423	.0330	19710.2	27608.0	71.018	12.58	16.66	3324.
2000.	.14535	9.1580	.0297	22259.2	30980.3	72.805	12.97	17.06	3470.
2200.	.15909	9.9751	.0271	24884.8	34430.2	74.441	13.40	17.49	3609.
2400.	.17286	10.7933	.0248	27601.9	37973.2	75.977	13.89	18.00	3741.
2600.	.18668	11.6124	.0229	30431.5	41632.2	77.441	14.49	18.65	3866.
2800.	.20060	12.4322	.0213	33407.7	45444.0	78.859	15.28	19.51	3984.
3000.	.21471	13.2526	.0199	36577.3	49459.7	80.253	16.31	20.66	4096.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

60.00 MPA ISOBAR

TEMPERATURE	DENSITY	$V(DH/DV)_P$	$V(DP/DU)_V$	$-V(DP/DV)_T$	$(DV/DT)_P/V$	THERMAL CONDUCTIVITY	VISCOSITY	THERMAL DIFFUSIVITY	DIELECTRIC CONSTANT	PRANDTL NUMBER
K	KG/CU M	KJ/KG	MPA-CU M/KJ X 10^2	MPA	1/K	W/K-M X 10^3	KG/M-S X 10^7	SQ M/HR		
* 27.559	95.5951	2051.5	.22930	365.3665	.00365	217.73	636.02	.00109	1.31803	2.1885
28.	95.4408	2062.7	.22776	363.3861	.00367	218.92	610.44	.00109	1.31747	2.1094
29.	95.0898	2087.0	.22441	358.8802	.00370	221.30	558.99	.00108	1.31620	1.9517
30.	94.7368	2109.1	.22134	354.3538	.00374	223.25	515.14	.00108	1.31492	1.8182
32.	94.0253	2150.7	.21550	345.2615	.00380	224.44	444.87	.00105	1.31233	1.6208
34.	93.3070	2186.9	.21028	336.1516	.00387	224.72	391.56	.00103	1.30973	1.4733
36.	92.5824	2218.8	.20551	327.0642	.00393	224.33	350.12	.00100	1.30711	1.3608
38.	91.8519	2245.9	.20123	318.0367	.00399	223.40	317.25	.00098	1.30447	1.2732
40.	91.1158	2266.5	.19765	309.1046	.00405	222.04	290.69	.00095	1.30181	1.2028
42.	90.3746	2284.6	.19427	300.3011	.00411	220.31	268.91	.00093	1.29914	1.1474
44.	89.6286	2302.2	.19091	291.6575	.00417	218.35	250.78	.00091	1.29645	1.1038
46.	88.8782	2326.3	.18679	283.2026	.00423	216.23	235.52	.00089	1.29375	1.0726
48.	88.1239	2345.4	.18323	274.9634	.00429	213.99	222.53	.00087	1.29105	1.0462
50.	87.3663	2362.0	.17993	266.9642	.00434	211.69	211.35	.00085	1.28833	1.0245
52.	86.6059	2376.7	.17687	259.2269	.00440	209.34	201.66	.00083	1.28560	1.0066
54.	85.8434	2389.6	.17401	251.7707	.00445	206.97	193.17	.00082	1.28288	.9916
56.	85.0795	2400.6	.17140	244.6121	.00449	204.60	185.69	.00080	1.28015	.9786
58.	84.3151	2409.1	.16910	237.7642	.00453	202.24	179.04	.00079	1.27742	.9668
60.	83.5509	2417.6	.16685	231.2368	.00457	200.18	173.11	.00078	1.27470	.9555
65.	81.6480	2441.8	.16132	216.3540	.00464	195.98	160.71	.00076	1.26794	.9291
70.	79.7274	2489.8	.15696	206.2574	.00465	191.68	150.75	.00075	1.26114	.9100
75.	77.8890	2531.7	.15141	195.3693	.00465	187.67	142.87	.00074	1.25465	.8966
80.	76.0998	2583.7	.14585	186.2454	.00463	183.99	136.37	.00073	1.24835	.8859
85.	74.3631	2629.5	.14025	176.8644	.00462	183.60	130.91	.00073	1.24226	.8659
90.	72.6669	2682.1	.13474	168.6176	.00460	183.03	126.21	.00074	1.23634	.8501
95.	71.0221	2737.6	.12943	161.1474	.00457	182.45	122.16	.00074	1.23060	.8372
100.	69.4259	2795.3	.12422	154.1877	.00454	181.95	118.62	.00074	1.22506	.8266
110.	66.3788	2945.4	.11338	142.6935	.00444	181.42	95.99	.00075	1.21452	.6917
120.	63.5332	3091.1	.10505	133.5510	.00432	178.59	95.18	.00076	1.20473	.7119
140.	58.4025	3394.0	.09183	119.2041	.00410	185.97	94.60	.00082	1.18721	.7077
160.	53.9490	3733.2	.08177	109.7236	.00383	196.01	94.72	.00092	1.17215	.6907
180.	50.1062	4084.0	.07419	102.8327	.00357	204.00	95.32	.00101	1.15925	.6806
200.	46.7707	4436.6	.06847	97.5868	.00333	209.70	96.34	.00109	1.14813	.6786
220.	43.8538	4790.4	.06404	93.5038	.00311	213.91	97.75	.00118	1.13847	.6818
240.	41.2843	5135.7	.06061	90.1241	.00293	217.46	99.48	.00126	1.13001	.6878
260.	39.0033	5476.2	.05789	87.3592	.00276	220.90	101.49	.00135	1.12253	.6944
280.	36.9667	5819.2	.05567	85.1829	.00260	224.54	103.73	.00144	1.11589	.7000
300.	35.0602	6048.3	.05549	83.2541	.00248	228.52	106.14	.00156	1.10969	.6976
350.	31.2041	6825.3	.05254	79.7700	.00219	240.04	112.73	.00185	1.09723	.7020
400.	28.1346	7580.6	.05055	77.2052	.00196	253.38	119.80	.00218	1.08738	.7028
450.	25.6289	8322.7	.04912	75.2225	.00178	267.88	127.12	.00254	1.07938	.7017
500.	23.5414	9063.6	.04797	73.6366	.00163	283.11	134.53	.00294	1.07276	.7003
550.	21.7735	9801.1	.04706	72.3365	.00150	298.78	141.95	.00336	1.06717	.6985
600.	20.2558	10541.9	.04627	71.2505	.00139	314.74	149.34	.00381	1.06238	.6967
650.	18.9377	11286.1	.04559	70.3299	.00130	330.92	156.67	.00429	1.05824	.6950
700.	17.7820	12040.1	.04495	69.5398	.00122	347.28	163.93	.00479	1.05462	.6934
750.	16.7599	12802.9	.04436	68.8550	.00115	363.78	171.10	.00531	1.05142	.6921
800.	15.8493	13577.7	.04379	68.2560	.00109	380.44	178.19	.00586	1.04858	.6909
850.	15.0329	14366.3	.04323	67.7282	.00103	397.24	185.19	.00643	1.04604	.6899
900.	14.2966	15170.0	.04268	67.2599	.00098	414.19	192.11	.00702	1.04375	.6892
950.	13.6292	15989.8	.04213	66.8420	.00093	431.29	198.95	.00763	1.04168	.6887
1000.	13.0213	16826.3	.04159	66.4668	.00089	448.53	205.70	.00826	1.03979	.6883
1100.	11.9549	18537.3	.04055	65.8219	.00082	475.56	218.98	.00943	1.03649	.6991
1200.	11.0499	20309.2	.03955	65.2883	.00076	511.00	231.97	.01083	1.03369	.6980
1300.	10.2722	22140.6	.03857	64.8401	.00070	546.88	244.69	.01230	1.03130	.6973
1400.	9.5966	24027.9	.03765	64.4590	.00066	583.15	257.17	.01384	1.02922	.6969
1500.	9.0043	25965.9	.03677	64.1313	.00062	619.72	269.41	.01546	1.02740	.6968
1600.	8.4807	27931.1	.03598	63.8466	.00058	656.12	281.42	.01715	1.02579	.6966
1700.	8.0147	29931.3	.03524	63.5973	.00055	692.58	293.23	.01891	1.02436	.6965
1800.	7.5971	31964.9	.03456	63.3771	.00052	729.16	304.83	.02075	1.02308	.6963
2000.	6.8798	36141.4	.03332	63.0054	.00047	803.43	327.42	.02464	1.02088	.6952
2200.	6.2858	40550.3	.03212	62.7012	.00043	882.42	344.88	.02889	1.01907	.6838
2400.	5.7852	45312.2	.03088	62.4414	.00040	971.22	366.20	.03357	1.01754	.6789
2600.	5.3568	50639.8	.02951	62.2057	.00037	1077.96	387.06	.03884	1.01623	.6697
2800.	4.9849	56818.1	.02794	61.9738	.00034	1213.26	407.54	.04490	1.01510	.6555
3000.	4.6575	64183.0	.02615	61.7244	.00032	1389.57	427.78	.05198	1.01410	.6362

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

65.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 28.449	.01036	4.0022	1.362	303.1	976.2	15.079	6.16	7.57	2218.
29.	.01038	3.9846	1.359	306.0	980.4	15.226	6.21	7.66	2217.
30.	.01041	3.9524	1.355	311.3	988.2	15.488	6.30	7.81	2213.
32.	.01049	3.8867	1.343	322.4	1004.1	16.001	6.47	8.10	2206.
34.	.01056	3.8198	1.330	333.8	1020.5	16.501	6.62	8.38	2199.
36.	.01064	3.7520	1.316	345.7	1037.6	16.987	6.75	8.63	2190.
38.	.01072	3.6836	1.301	358.0	1055.1	17.461	6.87	8.88	2182.
40.	.01081	3.6151	1.284	370.7	1073.1	17.922	6.96	9.09	2173.
42.	.01089	3.5468	1.267	383.6	1091.5	18.370	7.04	9.30	2164.
44.	.01098	3.4788	1.249	396.9	1110.3	18.807	7.13	9.50	2154.
46.	.01106	3.4117	1.231	409.9	1129.0	19.222	7.23	9.73	2143.
48.	.01115	3.3456	1.212	423.8	1148.6	19.641	7.32	9.94	2132.
50.	.01124	3.2809	1.193	437.9	1168.7	20.051	7.40	10.14	2121.
52.	.01134	3.2177	1.174	452.4	1189.2	20.452	7.46	10.32	2110.
54.	.01143	3.1564	1.154	467.0	1210.0	20.845	7.52	10.50	2099.
56.	.01153	3.0971	1.134	482.2	1231.4	21.236	7.57	10.65	2088.
58.	.01162	3.0401	1.113	497.2	1252.8	21.612	7.59	10.79	2078.
60.	.01172	2.9855	1.093	512.5	1274.6	21.980	7.62	10.92	2068.
65.	.01198	2.8605	1.041	551.1	1329.9	22.864	7.67	11.21	2044.
70.	.01225	2.7527	.9896	590.5	1386.6	23.705	7.72	11.45	2021.
75.	.01253	2.6984	.9479	630.7	1445.1	24.512	7.76	11.68	2015.
80.	.01281	2.6250	.9006	671.5	1504.0	25.273	7.82	11.88	1996.
85.	.01309	2.5726	.8561	712.9	1563.9	25.999	7.90	12.05	1981.
90.	.01338	2.5105	.8141	754.9	1624.6	26.693	7.98	12.23	1962.
95.	.01367	2.4550	.7749	797.5	1686.2	27.359	8.07	12.42	1943.
100.	.01397	2.4087	.7382	840.7	1748.8	28.000	8.18	12.59	1926.
110.	.01458	2.3293	.6709	930.6	1878.0	29.231	8.48	13.00	1889.
120.	.01519	2.2696	.6121	1021.8	2009.3	30.373	8.72	13.29	1860.
140.	.01646	2.1952	.5204	1210.8	2280.6	32.463	9.18	13.85	1820.
160.	.01775	2.1754	.4500	1407.9	2561.9	34.340	9.58	14.28	1800.
180.	.01906	2.1875	.3937	1611.3	2850.3	36.038	9.93	14.56	1791.
200.	.02037	2.2138	.3493	1819.5	3143.4	37.582	10.20	14.77	1790.
220.	.02168	2.2546	.3134	2031.3	3440.2	38.997	10.43	14.93	1797.
240.	.02298	2.3018	.2841	2246.0	3739.8	40.300	10.60	15.04	1807.
260.	.02428	2.3531	.2597	2462.9	4041.3	41.507	10.73	15.12	1821.
280.	.02558	2.4115	.2392	2681.2	4344.1	42.629	10.83	15.18	1838.
300.	.02694	2.4814	.2234	2885.3	4636.4	43.613	10.66	15.04	1871.
350.	.03019	2.6583	.1888	3424.3	5386.8	45.927	10.69	14.97	1929.
400.	.03342	2.8423	.1636	3960.8	6132.9	47.921	10.67	14.88	1991.
450.	.03662	3.0302	.1445	4494.6	6875.1	49.668	10.64	14.80	2053.
500.	.03981	3.2205	.1294	5025.9	7613.9	51.224	10.63	14.75	2114.
550.	.04300	3.4125	.1173	5555.5	8350.2	52.629	10.61	14.71	2175.
600.	.04617	3.6058	.1073	6084.3	9085.3	53.905	10.61	14.69	2234.
650.	.04934	3.8001	.0989	6612.6	9819.5	55.077	10.61	14.68	2293.
700.	.05250	3.9954	.0917	7141.4	10554.0	56.172	10.63	14.69	2350.
750.	.05566	4.1914	.0855	7671.3	11289.5	57.188	10.66	14.72	2405.
800.	.05883	4.3882	.0801	8202.7	12026.3	58.140	10.70	14.75	2460.
850.	.06198	4.5856	.0754	8736.3	12765.3	59.035	10.75	14.80	2513.
900.	.06514	4.7836	.0712	9272.6	13506.9	59.882	10.81	14.86	2564.
950.	.06830	4.9821	.0675	9811.9	14251.5	60.686	10.88	14.93	2615.
1000.	.07146	5.1811	.0641	10354.7	14999.6	61.452	10.96	15.01	2664.
1100.	.07778	5.5804	.0583	11454.0	16509.6	62.881	11.13	15.18	2759.
1200.	.08410	5.9812	.0534	12572.0	18038.3	64.203	11.32	15.37	2850.
1300.	.09042	6.3832	.0494	13710.2	19587.3	65.442	11.53	15.58	2937.
1400.	.09674	6.7864	.0458	14869.3	21157.3	66.613	11.75	15.80	3022.
1500.	.10306	7.1905	.0428	16049.9	22748.9	67.725	11.97	16.03	3103.
1600.	.10939	7.5953	.0402	17250.8	24360.9	68.759	12.18	16.24	3183.
1700.	.11571	8.0009	.0378	18473.0	25994.3	69.744	12.38	16.45	3260.
1800.	.12204	8.4071	.0357	19716.2	27648.8	70.689	12.58	16.65	3335.
2000.	.13470	9.2210	.0322	22265.1	31020.6	72.476	12.98	17.06	3481.
2200.	.14737	10.0365	.0293	24890.3	34469.6	74.111	13.40	17.49	3619.
2400.	.16008	10.8534	.0268	27605.6	38010.5	75.647	13.88	17.99	3751.
2600.	.17283	11.6713	.0248	30431.5	41665.3	77.109	14.47	18.62	3875.
2800.	.18567	12.4901	.0230	33400.2	45469.0	78.523	15.24	19.46	3993.
3000.	.19867	13.3096	.0215	36556.7	49470.5	79.913	16.24	20.57	4106.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

65.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 28.449	96.5666	2149.1	.22897	386.4808	.00352	226.54	671.06	.00112	1.32157	2.2428
29.	96.3788	2163.7	.22708	384.0341	.00354	227.87	637.85	.00111	1.32089	2.1437
30.	96.0369	2188.5	.22388	379.5738	.00357	229.95	584.76	.00110	1.31964	1.9860
32.	95.3485	2235.3	.21781	370.5907	.00362	231.29	500.23	.00108	1.31714	1.7527
34.	94.6545	2276.4	.21239	361.5592	.00368	231.68	436.78	.00105	1.31462	1.5792
36.	93.9554	2312.8	.20746	352.5185	.00373	231.37	387.81	.00103	1.31208	1.4473
38.	93.2515	2344.2	.20305	343.5058	.00379	230.48	349.23	.00100	1.30953	1.3449
40.	92.5432	2368.5	.19935	334.5557	.00384	229.15	318.27	.00098	1.30697	1.2628
42.	91.8306	2390.2	.19589	325.7010	.00389	227.42	293.03	.00096	1.30439	1.1981
44.	91.1142	2411.0	.19245	316.9722	.00394	225.46	272.14	.00094	1.30180	1.1471
46.	90.3942	2438.7	.18826	308.3978	.00399	223.32	254.64	.00091	1.29921	1.1100
48.	89.6710	2460.8	.18465	300.0041	.00404	221.07	239.82	.00089	1.29660	1.0787
50.	88.9450	2480.1	.18132	291.8155	.00409	218.74	227.13	.00087	1.29399	1.0529
52.	88.2165	2497.2	.17822	283.8540	.00413	216.36	216.17	.00086	1.29138	1.0316
54.	87.4862	2512.2	.17535	276.1393	.00418	213.95	206.62	.00084	1.28876	1.0137
56.	86.7546	2524.9	.17273	268.6887	.00422	211.54	198.24	.00082	1.28614	.9983
58.	86.0223	2534.5	.17042	261.5165	.00426	209.13	190.83	.00081	1.28352	.9846
60.	85.2899	2544.1	.16818	254.6345	.00429	207.03	184.23	.00080	1.28090	.9717
65.	83.4637	2569.7	.16264	238.7487	.00436	202.75	170.54	.00078	1.27439	.9427
70.	81.6539	2600.8	.15708	224.7719	.00440	198.47	159.83	.00076	1.26796	.9221
75.	79.8094	2654.4	.15300	215.3549	.00440	194.09	150.94	.00075	1.26143	.9086
80.	78.0755	2703.1	.14745	204.9503	.00439	190.27	143.92	.00074	1.25531	.8985
85.	76.3829	2764.9	.14195	196.5034	.00436	189.82	138.02	.00074	1.24935	.8758
90.	74.7374	2819.6	.13649	187.6264	.00434	189.23	133.01	.00075	1.24358	.8599
95.	73.1402	2877.1	.13125	179.5626	.00432	188.61	128.69	.00075	1.23799	.8472
100.	71.5815	2941.0	.12612	172.4154	.00428	188.05	124.90	.00075	1.23255	.8363
110.	68.6093	3096.7	.11525	159.8138	.00420	186.13	98.28	.00075	1.22223	.6864
120.	65.8245	3244.1	.10665	149.3972	.00410	183.09	97.63	.00075	1.21261	.7088
140.	60.7642	3551.1	.09333	133.3902	.00390	191.63	97.29	.00082	1.19525	.7033
160.	56.3265	3888.2	.08335	122.5338	.00367	203.32	97.50	.00091	1.18017	.6847
180.	52.4598	4244.3	.07560	114.7553	.00343	212.60	98.08	.00100	1.16714	.6718
200.	49.0968	4597.8	.06973	108.6924	.00321	218.94	99.01	.00109	1.15588	.6682
220.	46.1349	4954.4	.06517	104.0147	.00301	223.22	100.28	.00117	1.14602	.6707
240.	43.5148	5303.1	.06161	100.1616	.00284	226.41	101.86	.00125	1.13736	.6767
260.	41.1807	5642.7	.05879	96.9032	.00268	229.25	103.72	.00133	1.12967	.6842
280.	39.0881	5980.3	.05652	94.2613	.00254	232.18	105.79	.00141	1.12281	.6915
300.	37.1199	6201.4	.05645	92.1109	.00243	235.42	108.06	.00152	1.11639	.6903
350.	33.1220	6978.6	.05335	88.0478	.00214	245.26	114.33	.00178	1.10341	.6977
400.	29.9249	7733.9	.05124	85.0545	.00192	257.31	121.15	.00208	1.09312	.7006
450.	27.3054	8476.0	.04972	82.7398	.00175	270.89	128.27	.00241	1.08473	.7009
500.	25.1167	9216.9	.04850	80.8880	.00160	285.45	135.52	.00277	1.07776	.7002
550.	23.2585	9954.4	.04752	79.3692	.00148	300.64	142.82	.00316	1.07186	.6988
600.	21.6597	10695.0	.04669	78.1000	.00137	316.26	150.11	.00358	1.06681	.6972
650.	20.2687	11439.1	.04596	77.0235	.00128	332.17	157.35	.00402	1.06242	.6955
700.	19.0469	12192.9	.04529	76.0993	.00121	348.32	164.54	.00448	1.05858	.6941
750.	17.9648	12955.5	.04466	75.2978	.00114	364.68	171.65	.00497	1.05519	.6927
800.	16.9995	13730.1	.04407	74.5967	.00107	381.21	178.69	.00547	1.05217	.6915
850.	16.1329	14518.5	.04349	73.9787	.00102	397.92	185.65	.00600	1.04946	.6905
900.	15.3506	15322.1	.04291	73.4304	.00097	414.79	192.52	.00655	1.04703	.6897
950.	14.6407	16141.9	.04235	72.9409	.00092	431.82	199.33	.00711	1.04482	.6891
1000.	13.9936	16978.4	.04179	72.5016	.00088	449.01	206.05	.00770	1.04281	.6888
1100.	12.8570	18689.5	.04072	71.7464	.00081	475.56	219.28	.00877	1.03928	.7000
1200.	11.8910	20461.6	.03969	71.1217	.00075	511.00	232.23	.01006	1.03629	.6987
1300.	11.0598	22293.5	.03870	70.5974	.00070	546.88	244.93	.01142	1.03373	.6980
1400.	10.3371	24181.4	.03776	70.1517	.00065	583.15	257.38	.01285	1.03150	.6975
1500.	9.7029	26119.9	.03687	69.7686	.00061	619.72	269.60	.01435	1.02954	.6972
1600.	9.1420	28085.5	.03607	69.4362	.00058	656.11	281.60	.01591	1.02782	.6970
1700.	8.6422	30086.1	.03535	69.1452	.00055	692.56	293.39	.01754	1.02628	.6968
1800.	8.1941	32119.6	.03464	68.8884	.00052	729.12	304.97	.01923	1.02491	.6966
2000.	7.4239	36294.2	.03339	68.4555	.00047	803.28	327.54	.02284	1.02255	.6955
2200.	6.7854	40695.7	.03219	68.1022	.00043	881.93	344.88	.02676	1.02060	.6839
2400.	6.2471	45439.0	.03096	67.8020	.00040	969.97	366.20	.03107	1.01895	.6792
2600.	5.7861	50728.3	.02961	67.5319	.00037	1075.20	387.05	.03592	1.01754	.6704
2800.	5.3858	56837.8	.02806	67.2696	.00034	1207.82	407.53	.04149	1.01632	.6566
3000.	5.0333	64091.2	.02631	66.9921	.00032	1379.81	427.75	.04797	1.01525	.6378

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

70.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 29.318	.01026	4.1801	1.389	311.2	1029.2	15.130	6.22	7.65	2266.
30.	.01028	4.1593	1.385	314.8	1034.5	15.307	6.29	7.75	2264.
32.	.01035	4.0961	1.374	325.6	1050.2	15.816	6.46	8.04	2258.
34.	.01042	4.0316	1.361	336.9	1066.6	16.312	6.61	8.31	2251.
36.	.01050	3.9660	1.346	348.6	1083.5	16.794	6.75	8.56	2243.
38.	.01057	3.8996	1.331	360.7	1100.8	17.264	6.87	8.80	2235.
40.	.01065	3.8328	1.315	373.1	1118.7	17.721	6.96	9.01	2227.
42.	.01073	3.7658	1.298	385.8	1136.9	18.165	7.05	9.21	2218.
44.	.01081	3.6990	1.280	398.8	1155.5	18.598	7.13	9.41	2209.
46.	.01089	3.6326	1.262	411.6	1174.0	19.009	7.25	9.64	2198.
48.	.01097	3.5669	1.244	425.3	1193.5	19.424	7.34	9.84	2188.
50.	.01106	3.5023	1.225	439.2	1213.4	19.830	7.42	10.04	2177.
52.	.01115	3.4389	1.206	453.4	1233.6	20.227	7.49	10.22	2166.
54.	.01123	3.3770	1.186	467.9	1254.2	20.615	7.54	10.38	2156.
56.	.01132	3.3169	1.167	482.8	1275.4	21.002	7.59	10.54	2146.
58.	.01141	3.2586	1.147	497.6	1296.6	21.374	7.63	10.68	2136.
60.	.01151	3.2024	1.127	512.6	1318.1	21.738	7.65	10.80	2126.
65.	.01174	3.0721	1.076	550.8	1372.9	22.613	7.71	11.09	2102.
70.	.01199	2.9572	1.026	589.7	1429.0	23.445	7.77	11.35	2078.
75.	.01224	2.8583	.9754	629.3	1486.3	24.236	7.82	11.56	2056.
80.	.01251	2.8104	.9375	669.7	1545.7	25.002	7.88	11.80	2051.
85.	.01278	2.7389	.8922	710.7	1605.1	25.723	7.96	11.99	2031.
90.	.01304	2.6879	.8500	752.4	1665.5	26.414	8.05	12.16	2016.
95.	.01331	2.6388	.8108	794.7	1726.7	27.075	8.14	12.33	2000.
100.	.01359	2.5856	.7738	837.6	1788.9	27.713	8.24	12.52	1982.
110.	.01415	2.5054	.7068	927.1	1917.5	28.937	8.55	12.94	1947.
120.	.01472	2.4419	.6464	1018.0	2048.2	30.075	8.79	13.24	1918.
140.	.01588	2.3428	.5496	1206.6	2318.2	32.154	9.25	13.80	1870.
160.	.01708	2.3086	.4780	1403.3	2598.8	34.026	9.65	14.27	1848.
180.	.01829	2.3219	.4199	1606.9	2887.1	35.724	9.99	14.56	1840.
200.	.01950	2.3430	.3730	1815.3	3180.1	37.267	10.26	14.77	1837.
220.	.02071	2.3767	.3350	2027.6	3477.0	38.682	10.48	14.94	1840.
240.	.02191	2.4198	.3039	2242.8	3776.7	39.987	10.65	15.05	1849.
260.	.02312	2.4681	.2779	2460.1	4078.4	41.194	10.78	15.13	1861.
280.	.02432	2.5196	.2561	2678.9	4381.4	42.317	10.88	15.19	1876.
300.	.02558	2.5891	.2399	2882.6	4673.3	43.298	10.69	15.06	1909.
350.	.02860	2.7609	.2029	3422.6	5424.5	45.616	10.72	14.98	1965.
400.	.03159	2.9409	.1758	3960.1	6171.5	47.611	10.70	14.90	2023.
450.	.03457	3.1257	.1552	4494.7	6914.4	49.360	10.67	14.81	2083.
500.	.03753	3.3133	.1391	5026.8	7653.7	50.918	10.65	14.76	2143.
550.	.04048	3.5030	.1260	5557.0	8390.4	52.323	10.63	14.72	2202.
600.	.04342	3.6941	.1153	6086.3	9125.9	53.599	10.63	14.70	2260.
650.	.04636	3.8865	.1062	6615.1	9860.4	54.772	10.63	14.69	2317.
700.	.04930	4.0800	.0985	7144.3	10595.1	55.867	10.65	14.70	2373.
750.	.05223	4.2743	.0919	7674.6	11330.7	56.884	10.68	14.72	2427.
800.	.05516	4.4695	.0861	8206.3	12067.6	57.835	10.72	14.75	2481.
850.	.05809	4.6655	.0810	8740.2	12806.7	58.731	10.76	14.80	2533.
900.	.06102	4.8621	.0765	9276.7	13548.3	59.578	10.82	14.86	2583.
950.	.06395	5.0593	.0725	9816.3	14293.0	60.382	10.89	14.93	2633.
1000.	.06688	5.2571	.0689	10359.3	15041.1	61.148	10.97	15.01	2681.
1100.	.07274	5.6542	.0626	11459.0	16551.0	62.577	11.14	15.18	2775.
1200.	.07860	6.0529	.0574	12577.4	18079.7	63.899	11.33	15.37	2865.
1300.	.08447	6.4532	.0530	13715.8	19628.5	65.138	11.54	15.58	2952.
1400.	.09033	6.8547	.0493	14875.2	21198.4	66.309	11.76	15.80	3035.
1500.	.09620	7.2574	.0460	16055.9	22789.8	67.421	11.98	16.03	3116.
1600.	.10207	7.6609	.0432	17257.0	24401.8	68.454	12.19	16.24	3195.
1700.	.10794	8.0653	.0406	18479.3	26035.0	69.440	12.39	16.45	3272.
1800.	.11381	8.4703	.0384	19722.6	27689.3	70.384	12.59	16.65	3347.
2000.	.12556	9.2822	.0346	22271.6	31060.8	72.171	12.99	17.05	3491.
2200.	.13732	10.0961	.0315	24896.3	34508.9	73.806	13.40	17.48	3629.
2400.	.14911	10.9115	.0289	27610.2	38047.9	75.340	13.87	17.98	3760.
2600.	.16094	11.7282	.0267	30432.7	41698.8	76.801	14.45	18.60	3884.
2800.	.17286	12.5459	.0248	33394.8	45495.3	78.213	15.20	19.41	4002.
3000.	.18492	13.3644	.0231	36539.5	49484.2	79.598	16.17	20.49	4114.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

70.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 29.318	97.4967	2244.6	.22878	407.5451	.00341	235.03	706.81	.00113	1.32496	2.2999
30.	97.2698	2263.3	.22652	404.5479	.00342	236.48	664.21	.00113	1.32413	2.1766
32.	96.6013	2315.3	.22019	395.6857	.00347	237.97	562.84	.00110	1.32170	1.9014
34.	95.9283	2361.3	.21457	386.7464	.00352	238.45	487.31	.00108	1.31925	1.6980
36.	95.2513	2402.4	.20946	377.7693	.00356	238.21	429.54	.00105	1.31678	1.5440
38.	94.5704	2438.0	.20490	368.7910	.00361	237.36	384.35	.00103	1.31431	1.4249
40.	93.8860	2466.2	.20109	359.8459	.00365	236.04	348.32	.00100	1.31183	1.3297
42.	93.1984	2491.4	.19752	350.9664	.00370	234.32	319.11	.00098	1.30934	1.2546
44.	92.5077	2515.7	.19399	342.1825	.00374	232.34	295.08	.00096	1.30684	1.1953
46.	91.8141	2547.0	.18972	333.5225	.00378	230.19	275.04	.00094	1.30433	1.1517
48.	91.1180	2572.3	.18605	325.0125	.00383	227.91	258.15	.00091	1.30182	1.1149
50.	90.4196	2594.6	.18267	316.6769	.00387	225.54	243.76	.00089	1.29930	1.0846
52.	89.7192	2614.2	.17954	308.5377	.00391	223.12	231.37	.00088	1.29678	1.0594
54.	89.0173	2631.5	.17664	300.6150	.00395	220.67	220.63	.00086	1.29425	1.0383
56.	88.3142	2646.1	.17400	292.9268	.00398	218.22	211.24	.00084	1.29173	1.0202
58.	87.6105	2657.3	.17168	285.4884	.00402	215.76	202.97	.00083	1.28920	1.0042
60.	86.9066	2668.2	.16943	278.3130	.00405	213.62	195.64	.00082	1.28668	.9894
65.	85.1501	2696.2	.16388	261.5869	.00411	209.27	180.52	.00080	1.28040	.9571
70.	83.4061	2728.9	.15830	246.6504	.00416	204.88	168.78	.00078	1.27418	.9348
75.	81.6851	2768.1	.15264	233.4795	.00418	200.60	159.41	.00076	1.26807	.9190
80.	79.9139	2826.6	.14884	224.5879	.00417	196.33	151.41	.00075	1.26180	.9099
85.	78.2693	2881.0	.14325	214.3757	.00416	195.86	145.08	.00075	1.25599	.8882
90.	76.6635	2948.2	.13782	206.0676	.00413	195.21	139.71	.00075	1.25033	.8704
95.	75.1048	3014.8	.13266	198.1874	.00409	194.53	135.10	.00076	1.24486	.8566
100.	73.5871	3078.2	.12758	190.2657	.00407	193.94	131.08	.00076	1.23955	.8461
110.	70.6790	3242.8	.11692	177.0813	.00399	190.48	100.35	.00075	1.22941	.6819
120.	67.9484	3398.3	.10820	165.9205	.00390	187.24	99.88	.00075	1.21994	.7062
140.	62.9718	3703.6	.09441	147.5332	.00373	197.01	99.81	.00082	1.20280	.6990
160.	58.5562	4034.0	.08463	135.1813	.00354	210.50	100.16	.00091	1.18773	.6787
180.	54.6784	4401.9	.07689	126.9584	.00331	221.30	100.76	.00100	1.17460	.6628
200.	51.2917	4760.5	.07086	120.1748	.00310	228.53	101.63	.00109	1.16322	.6570
220.	48.2948	5117.0	.06619	114.7806	.00292	233.06	102.80	.00116	1.15320	.6588
240.	45.6339	5468.6	.06252	110.4232	.00275	236.02	104.25	.00124	1.14436	.6647
260.	43.2550	5811.7	.05960	106.7565	.00260	238.32	105.95	.00131	1.13650	.6727
280.	41.1164	6144.6	.05725	103.5957	.00247	240.55	107.89	.00139	1.12946	.6812
300.	39.0924	6353.7	.05737	101.2148	.00237	243.03	110.02	.00149	1.12283	.6816
350.	34.9676	7131.2	.05413	96.5405	.00210	251.08	115.98	.00173	1.10939	.6922
400.	31.6542	7886.8	.05191	93.0932	.00189	261.72	122.55	.00200	1.09868	.6975
450.	28.9300	8629.0	.05030	90.4261	.00172	274.26	129.46	.00230	1.08993	.6993
500.	26.6473	9370.1	.04901	88.2911	.00158	288.08	136.55	.00264	1.08263	.6996
550.	24.7046	10107.7	.04797	86.5392	.00146	302.73	143.72	.00300	1.07645	.6987
600.	23.0296	10848.2	.04709	85.0743	.00135	317.94	150.90	.00338	1.07114	.6975
650.	21.5697	11592.2	.04632	83.8311	.00127	333.56	158.06	.00379	1.06652	.6960
700.	20.2852	12345.8	.04561	82.7633	.00119	349.48	165.17	.00422	1.06247	.6946
750.	19.1460	13108.2	.04495	81.8368	.00112	365.66	172.22	.00467	1.05889	.6932
800.	18.1285	13882.6	.04433	81.0261	.00106	382.06	179.20	.00514	1.05570	.6920
850.	17.2139	14670.9	.04373	80.3112	.00101	398.65	186.12	.00563	1.05284	.6910
900.	16.3874	15474.4	.04313	79.6768	.00096	415.43	192.96	.00614	1.05026	.6902
950.	15.6366	16294.1	.04255	79.1104	.00092	432.39	199.72	.00667	1.04792	.6896
1000.	14.9516	17130.6	.04197	78.6020	.00088	449.52	206.42	.00721	1.04578	.6892
1100.	13.7471	18841.7	.04088	77.7280	.00081	475.56	219.60	.00820	1.04204	.7010
1200.	12.7219	20614.1	.03983	77.0053	.00075	511.00	232.51	.00941	1.03886	.6995
1300.	11.8389	22446.2	.03882	76.3988	.00069	546.88	245.17	.01067	1.03613	.6986
1400.	11.0702	24334.5	.03787	75.8835	.00065	583.15	257.60	.01200	1.03376	.6980
1500.	10.3951	26273.5	.03696	75.4409	.00061	619.72	269.80	.01339	1.03168	.6977
1600.	9.7974	28239.5	.03615	75.0570	.00058	656.10	281.78	.01485	1.02983	.6974
1700.	9.2646	30240.2	.03540	74.7213	.00054	692.55	293.55	.01636	1.02820	.6972
1800.	8.7866	32273.7	.03471	74.4252	.00052	729.09	305.12	.01794	1.02673	.6969
2000.	7.9643	36446.3	.03345	73.9267	.00047	803.14	327.67	.02129	1.02420	.6958
2200.	7.2821	40841.1	.03225	73.5209	.00043	881.51	344.88	.02493	1.02211	.6840
2400.	6.7064	45567.7	.03103	73.1775	.00039	968.87	366.20	.02893	1.02035	.6794
2600.	6.2133	50822.8	.02969	72.8709	.00037	1072.74	387.05	.03342	1.01885	.6710
2800.	5.7849	56871.0	.02817	72.5766	.00034	1202.98	407.52	.03856	1.01754	.6576
3000.	5.4076	64025.0	.02645	72.2696	.00032	1371.13	427.73	.04454	1.01639	.6393

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

80.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 30.999	.01008	4.5298	1.441	327.6	1133.7	15.224	6.35	7.80	2358.
32.	.01011	4.5007	1.435	332.9	1141.6	15.474	6.44	7.94	2355.
34.	.01017	4.4412	1.421	343.8	1157.7	15.964	6.60	8.20	2349.
36.	.01024	4.3802	1.406	355.1	1174.4	16.440	6.74	8.45	2343.
38.	.01031	4.3178	1.391	366.8	1191.5	16.903	6.87	8.68	2336.
40.	.01038	4.2545	1.374	378.9	1209.1	17.353	6.97	8.88	2328.
42.	.01045	4.1906	1.357	391.2	1227.0	17.791	7.06	9.07	2321.
44.	.01052	4.1263	1.339	403.8	1245.4	18.217	7.15	9.26	2313.
46.	.01059	4.0620	1.322	416.3	1263.6	18.622	7.26	9.48	2303.
48.	.01067	3.9979	1.303	429.5	1282.7	19.030	7.35	9.68	2293.
50.	.01074	3.9342	1.285	443.1	1302.3	19.428	7.44	9.86	2283.
52.	.01082	3.8712	1.266	456.9	1322.2	19.819	7.52	10.04	2273.
54.	.01089	3.8092	1.247	471.0	1342.4	20.201	7.58	10.20	2263.
56.	.01097	3.7484	1.228	485.5	1363.2	20.580	7.64	10.35	2254.
58.	.01105	3.6888	1.209	500.0	1384.1	20.946	7.68	10.48	2244.
60.	.01113	3.6308	1.190	514.7	1405.2	21.303	7.71	10.61	2235.
65.	.01134	3.4936	1.141	551.9	1459.0	22.163	7.79	10.90	2212.
70.	.01155	3.3690	1.092	590.1	1514.1	22.981	7.86	11.17	2188.
75.	.01177	3.2580	1.043	629.0	1570.6	23.760	7.93	11.40	2164.
80.	.01199	3.1609	.9949	668.6	1628.1	24.503	8.00	11.61	2141.
85.	.01222	3.0766	.9473	708.8	1686.6	25.212	8.09	11.79	2118.
90.	.01247	3.0327	.9169	749.8	1747.7	25.911	8.17	12.05	2115.
95.	.01271	2.9769	.8751	791.5	1808.3	26.565	8.27	12.22	2097.
100.	.01295	2.9212	.8370	834.0	1869.9	27.197	8.38	12.40	2079.
110.	.01343	2.8310	.7691	922.6	1997.4	28.410	8.69	12.84	2045.
120.	.01393	2.7645	.7095	1012.9	2127.2	29.540	8.93	13.17	2019.
140.	.01493	2.6714	.6055	1201.0	2395.5	31.608	9.39	13.68	1972.
160.	.01596	2.5674	.5274	1397.1	2673.8	33.464	9.78	14.19	1930.
180.	.01701	2.5527	.4682	1600.4	2961.4	35.158	10.11	14.58	1919.
200.	.01807	2.5993	.4183	1809.3	3254.9	36.704	10.38	14.77	1924.
220.	.01912	2.6204	.3764	2022.3	3551.9	38.119	10.60	14.95	1922.
240.	.02017	2.6518	.3419	2238.3	3851.8	39.424	10.76	15.07	1927.
260.	.02122	2.6955	.3131	2456.5	4153.9	40.634	10.89	15.14	1936.
280.	.02226	2.7419	.2886	2676.2	4457.2	41.757	10.98	15.20	1948.
300.	.02336	2.8067	.2723	2878.5	4747.6	42.732	10.76	15.09	1984.
350.	.02600	2.9678	.2305	3420.4	5500.5	45.054	10.78	15.02	2033.
400.	.02862	3.1398	.1999	3959.6	6249.0	47.054	10.75	14.92	2087.
450.	.03122	3.3179	.1765	4495.9	6993.1	48.806	10.72	14.84	2143.
500.	.03380	3.4998	.1581	5029.3	7733.5	50.366	10.70	14.78	2199.
550.	.03638	3.6845	.1433	5560.7	8471.1	51.772	10.68	14.73	2255.
600.	.03895	3.8711	.1310	6091.2	9207.2	53.050	10.67	14.71	2310.
650.	.04152	4.0594	.1208	6620.9	9942.2	54.223	10.67	14.70	2364.
700.	.04408	4.2490	.1120	7151.0	10677.3	55.320	10.69	14.70	2418.
750.	.04664	4.4398	.1045	7682.1	11413.2	56.336	10.71	14.72	2470.
800.	.04920	4.6316	.0979	8214.5	12150.3	57.288	10.75	14.76	2522.
850.	.05176	4.8244	.0921	8749.0	12889.5	58.184	10.80	14.80	2572.
900.	.05431	5.0180	.0870	9286.1	13631.1	59.030	10.86	14.86	2621.
950.	.05687	5.2124	.0824	9826.1	14375.8	59.834	10.92	14.93	2669.
1000.	.05943	5.4076	.0783	10369.6	15123.9	60.601	11.00	15.01	2716.
1100.	.06454	5.7997	.0712	11470.2	16633.7	62.029	11.17	15.18	2807.
1200.	.06966	6.1941	.0653	12589.1	18162.1	63.352	11.36	15.37	2895.
1300.	.07478	6.5904	.0604	13728.1	19710.7	64.590	11.56	15.58	2980.
1400.	.07990	6.9883	.0561	14888.0	21280.4	65.761	11.78	15.80	3062.
1500.	.08503	7.3876	.0524	16069.2	22871.5	66.873	12.00	16.02	3141.
1600.	.09016	7.7882	.0491	17270.7	24483.1	67.906	12.20	16.24	3219.
1700.	.09528	8.1898	.0463	18493.3	26116.0	68.891	12.41	16.44	3294.
1800.	.10041	8.5924	.0437	19736.9	27770.0	69.836	12.61	16.65	3368.
2000.	.11068	9.3998	.0394	22286.0	31140.6	71.622	13.00	17.05	3511.
2200.	.12096	10.2099	.0359	24910.0	34587.1	73.256	13.41	17.47	3647.
2400.	.13127	11.0220	.0329	27621.5	38122.8	74.789	13.87	17.95	3777.
2600.	.14161	11.8358	.0304	30438.3	41767.0	76.247	14.43	18.55	3901.
2800.	.15202	12.6509	.0282	33389.1	45550.9	77.654	15.14	19.33	4018.
3000.	.16255	13.4672	.0264	36513.9	49518.2	79.032	16.06	20.36	4130.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

80.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 30.999	99.2474	2432.2	.22854	449.5687	.00321	250.16	780.58	.00116	1.33135	2.4328
32.	98.9287	2462.8	.22519	445.2508	.00322	250.87	713.79	.00115	1.33019	2.2582
34.	98.2898	2518.5	.21912	436.5283	.00326	251.53	607.43	.00112	1.32785	1.9803
36.	97.6487	2568.9	.21362	427.7161	.00329	251.40	527.40	.00110	1.32551	1.7722
38.	97.0055	2613.3	.20874	418.8511	.00332	250.60	465.69	.00107	1.32317	1.6124
40.	96.3604	2649.3	.20466	409.9674	.00335	249.31	417.12	.00105	1.32082	1.4857
42.	95.7136	2681.9	.20086	401.0970	.00338	247.56	378.19	.00103	1.31846	1.3861
44.	95.0651	2713.2	.19713	392.2698	.00341	245.55	346.50	.00100	1.31611	1.3074
46.	94.4152	2752.1	.19268	383.5138	.00345	243.33	320.34	.00098	1.31375	1.2485
48.	93.7638	2784.1	.18886	374.8552	.00348	240.98	298.49	.00096	1.31139	1.1990
50.	93.1112	2812.5	.18536	366.3183	.00351	238.54	280.02	.00093	1.30902	1.1580
52.	92.4575	2837.8	.18212	357.9256	.00354	236.03	264.26	.00092	1.30666	1.1240
54.	91.8029	2860.1	.17914	349.6978	.00357	233.49	250.70	.00090	1.30429	1.0953
56.	91.1477	2879.1	.17644	341.6538	.00360	230.94	238.92	.00088	1.30193	1.0709
58.	90.4922	2894.1	.17408	333.8105	.00362	228.38	228.63	.00087	1.29956	1.0495
60.	89.8367	2908.3	.17179	326.1830	.00365	226.16	219.57	.00085	1.29720	1.0301
65.	88.2001	2943.3	.16619	308.1377	.00370	221.63	201.10	.00083	1.29132	.9892
70.	86.5721	2981.2	.16059	291.6594	.00375	217.05	186.99	.00081	1.28548	.9619
75.	84.9602	3024.6	.15488	276.8026	.00377	212.54	175.89	.00079	1.27972	.9435
80.	83.3722	3074.9	.14908	263.5304	.00378	208.33	166.95	.00077	1.27406	.9303
85.	81.8151	3132.7	.14320	251.7159	.00376	207.78	159.60	.00078	1.26853	.9055
90.	80.1666	3195.9	.13998	243.1203	.00377	206.63	152.93	.00077	1.26269	.8921
95.	78.6848	3270.2	.13448	234.2384	.00374	205.88	147.72	.00077	1.25745	.8767
100.	77.2243	3341.6	.12939	225.5857	.00371	205.17	143.17	.00077	1.25231	.8652
110.	74.4329	3516.7	.11894	210.7199	.00365	198.22	103.96	.00075	1.24251	.6732
120.	71.7961	3683.5	.11069	198.4820	.00357	194.63	103.86	.00074	1.23330	.7027
140.	66.9708	4040.6	.09627	178.9029	.00338	206.98	104.41	.00081	1.21656	.6898
160.	62.6633	4329.7	.08607	160.8803	.00328	224.49	105.14	.00091	1.20175	.6648
180.	58.7805	4673.0	.07881	150.0471	.00312	238.98	105.89	.00100	1.18850	.6461
200.	55.3429	5080.4	.07284	143.8526	.00291	248.71	106.73	.00109	1.17685	.6341
220.	52.3020	5441.1	.06793	137.0497	.00275	254.36	107.75	.00117	1.16661	.6331
240.	49.5830	5793.5	.06408	131.4833	.00260	257.29	108.99	.00124	1.15750	.6383
260.	47.1312	6145.5	.06101	127.0411	.00246	258.76	110.46	.00131	1.14933	.6465
280.	44.9199	6485.7	.05850	123.1659	.00234	259.67	112.14	.00137	1.14200	.6563
300.	42.8013	6655.4	.05913	120.1304	.00227	260.60	114.01	.00145	1.13500	.6601
350.	38.4605	7434.3	.05562	114.1447	.00202	264.74	119.38	.00165	1.12076	.6771
400.	34.9447	8190.9	.05319	109.7182	.00182	272.13	125.45	.00188	1.10932	.6880
450.	32.0350	8934.0	.05141	106.2877	.00166	282.24	131.96	.00214	1.09991	.6937
500.	29.5836	9675.8	.04998	103.5380	.00153	294.27	138.72	.00242	1.09202	.6966
550.	27.4879	10413.8	.04882	101.2786	.00141	307.62	145.62	.00273	1.08531	.6974
600.	25.6738	11154.6	.04784	99.3867	.00132	321.88	152.58	.00307	1.07953	.6972
650.	24.0871	11898.5	.04699	97.7790	.00124	336.78	159.55	.00342	1.07449	.6962
700.	22.6868	12652.0	.04621	96.3963	.00116	352.17	166.51	.00380	1.07005	.6952
750.	21.4414	13414.2	.04549	95.1954	.00110	367.93	173.43	.00420	1.06612	.6940
800.	20.3262	14188.4	.04482	94.1434	.00104	383.99	180.30	.00461	1.06260	.6929
850.	19.3216	14976.4	.04417	93.2151	.00099	400.33	187.12	.00504	1.05945	.6919
900.	18.4117	15779.7	.04354	92.3908	.00094	416.89	193.88	.00549	1.05659	.6911
950.	17.5838	16599.2	.04292	91.6544	.00090	433.68	200.57	.00595	1.05400	.6905
1000.	16.8270	17435.7	.04231	90.9932	.00086	450.67	207.20	.00642	1.05163	.6900
1100.	15.4932	19146.7	.04117	89.8565	.00079	475.56	220.28	.00728	1.04747	.7031
1200.	14.3550	20919.2	.04007	88.9164	.00073	511.00	233.11	.00834	1.04393	.7012
1300.	13.3722	22751.7	.03903	88.1279	.00068	546.88	245.70	.00945	1.04088	.7000
1400.	12.5150	24640.5	.03805	87.4585	.00064	583.15	258.07	.01062	1.03822	.6992
1500.	11.7607	26580.1	.03712	86.8840	.00060	619.72	270.22	.01184	1.03589	.6986
1600.	11.0919	28546.3	.03629	86.3863	.00057	656.09	282.16	.01312	1.03382	.6982
1700.	10.4949	30547.1	.03553	85.9515	.00054	692.52	293.90	.01445	1.03198	.6979
1800.	9.9587	32580.2	.03482	85.5686	.00051	729.03	305.44	.01583	1.03033	.6975
2000.	9.0348	36749.0	.03355	84.9255	.00046	802.90	327.94	.01877	1.02749	.6963
2200.	8.2669	41131.7	.03234	84.4043	.00042	880.77	344.88	.02195	1.02513	.6841
2400.	7.6181	45829.2	.03113	83.9666	.00039	966.97	366.20	.02545	1.02314	.6799
2600.	7.0617	51025.3	.02982	83.5806	.00036	1068.54	387.04	.02936	1.02144	.6719
2800.	6.5780	56968.4	.02835	83.2172	.00034	1194.69	407.50	.03383	1.01996	.6593
3000.	6.1518	63952.0	.02668	82.8475	.00032	1356.25	427.69	.03899	1.01866	.6419

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

90.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 32.614	.00991	4.8726	1.492	344.2	1236.4	15.312	6.48	7.94	2444.
34.	.00996	4.8345	1.482	351.6	1247.6	15.647	6.59	8.12	2441.
36.	.01002	4.7780	1.466	362.5	1264.1	16.118	6.74	8.36	2435.
38.	.01008	4.7198	1.450	373.9	1281.0	16.577	6.87	8.59	2429.
40.	.01014	4.6602	1.432	385.6	1298.4	17.022	6.97	8.78	2423.
42.	.01021	4.5996	1.415	397.7	1316.1	17.455	7.07	8.97	2416.
44.	.01027	4.5382	1.397	410.0	1334.3	17.876	7.16	9.15	2409.
46.	.01033	4.4764	1.379	422.1	1352.3	18.275	7.28	9.37	2400.
48.	.01040	4.4143	1.360	435.1	1371.2	18.678	7.38	9.56	2391.
50.	.01047	4.3522	1.342	448.3	1390.5	19.072	7.47	9.74	2382.
52.	.01054	4.2904	1.323	461.8	1410.1	19.457	7.55	9.90	2373.
54.	.01061	4.2290	1.304	475.6	1430.1	19.834	7.62	10.06	2363.
56.	.01068	4.1684	1.286	489.8	1450.6	20.208	7.68	10.21	2354.
58.	.01075	4.1087	1.267	504.0	1471.1	20.569	7.72	10.33	2345.
60.	.01082	4.0500	1.248	518.3	1491.9	20.921	7.76	10.46	2337.
65.	.01100	3.9093	1.201	554.9	1544.9	21.768	7.85	10.75	2314.
70.	.01119	3.7786	1.153	592.3	1599.4	22.575	7.93	11.01	2291.
75.	.01138	3.6597	1.105	630.6	1655.0	23.343	8.02	11.26	2267.
80.	.01158	3.5532	1.058	669.7	1711.9	24.078	8.11	11.49	2244.
85.	.01178	3.4592	1.011	709.5	1769.9	24.781	8.20	11.69	2220.
90.	.01199	3.3767	.9648	750.1	1828.8	25.455	8.31	11.87	2197.
95.	.01219	3.3041	.9199	791.3	1888.5	26.100	8.41	12.03	2174.
100.	.01243	3.2490	.8965	833.1	1951.6	26.746	8.51	12.33	2170.
110.	.01285	3.1374	.8228	921.1	2077.8	27.947	8.83	12.75	2129.
120.	.01329	3.0689	.7615	1010.8	2207.0	29.072	9.07	13.07	2103.
140.	.01418	2.9813	.6595	1198.3	2474.8	31.135	9.53	13.64	2066.
160.	.01508	2.8959	.5722	1394.5	2751.4	32.980	9.93	14.04	2024.
180.	.01599	2.7697	.5084	1597.3	3036.3	34.658	10.24	14.54	1983.
200.	.01693	2.7672	.4587	1806.1	3329.7	36.204	10.50	14.86	1979.
220.	.01787	2.8492	.4157	2019.6	3627.7	37.624	10.71	14.97	1995.
240.	.01880	2.8914	.3780	2236.4	3928.3	38.932	10.88	15.07	2001.
260.	.01972	2.9172	.3463	2455.3	4230.4	40.142	11.00	15.16	2005.
280.	.02065	2.9541	.3196	2675.9	4534.0	41.266	11.09	15.22	2013.
300.	.02163	3.0270	.3042	2875.9	4822.6	42.233	10.82	15.11	2056.
350.	.02397	3.1770	.2578	3419.4	5576.8	44.560	10.84	15.04	2100.
400.	.02629	3.3404	.2236	3960.3	6326.7	46.563	10.81	14.95	2149.
450.	.02860	3.5114	.1975	4498.0	7072.0	48.318	10.77	14.86	2201.
500.	.03090	3.6874	.1769	5032.8	7813.4	49.879	10.74	14.80	2253.
550.	.03318	3.8667	.1603	5565.5	8551.8	51.288	10.72	14.75	2306.
600.	.03546	4.0486	.1466	6097.1	9288.6	52.567	10.71	14.72	2359.
650.	.03774	4.2324	.1351	6627.8	10024.1	53.741	10.71	14.70	2410.
700.	.04001	4.4178	.1253	7158.8	10759.5	54.838	10.72	14.71	2461.
750.	.04228	4.6048	.1169	7690.6	11495.7	55.855	10.75	14.73	2512.
800.	.04455	4.7929	.1096	8223.7	12232.9	56.807	10.78	14.76	2561.
850.	.04681	4.9823	.1031	8758.9	12972.2	57.702	10.83	14.80	2610.
900.	.04908	5.1726	.0974	9296.6	13713.9	58.549	10.89	14.86	2657.
950.	.05135	5.3640	.0922	9837.2	14458.5	59.353	10.96	14.93	2704.
1000.	.05362	5.5561	.0877	10381.2	15206.6	60.120	11.03	15.01	2749.
1100.	.05815	5.9428	.0797	11482.6	16716.2	61.548	11.20	15.18	2838.
1200.	.06269	6.3323	.0731	12602.3	18244.4	62.870	11.38	15.37	2924.
1300.	.06723	6.7241	.0676	13741.9	19792.7	64.108	11.59	15.58	3006.
1400.	.07177	7.1179	.0628	14902.4	21362.0	65.279	11.80	15.80	3087.
1500.	.07632	7.5135	.0587	16084.1	22952.8	66.390	12.02	16.02	3165.
1600.	.08087	7.9107	.0550	17286.0	24564.0	67.423	12.23	16.23	3241.
1700.	.08542	8.3091	.0518	18508.9	26196.6	68.408	12.43	16.44	3315.
1800.	.08997	8.7088	.0490	19752.8	27850.2	69.352	12.63	16.64	3388.
2000.	.09909	9.5111	.0442	22302.2	31219.9	71.138	13.01	17.04	3529.
2200.	.10821	10.3168	.0402	24925.8	34664.9	72.772	13.42	17.46	3664.
2400.	.11736	11.1250	.0369	27635.5	38197.7	74.303	13.87	17.93	3793.
2600.	.12654	11.9355	.0341	30447.6	41836.2	75.759	14.41	18.51	3916.
2800.	.13578	12.7476	.0317	33389.2	45609.5	77.162	15.10	19.26	4033.
3000.	.14512	13.5613	.0296	36497.5	49558.7	78.534	15.98	20.24	4144.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

90.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(\partial H/\partial V)_P$ KJ/KG	$V(\partial P/\partial U)_V$ MPA-CU M/KJ X 10^2	$-V(\partial P/\partial V)_T$ MPA	$(\partial V/\partial T)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 32.614	100.8714	2616.2	.22835	491.5039	.00304	263.61	857.52	.00118	1.33730	2.5836
34.	100.4467	2660.7	.22391	485.6133	.00305	264.09	759.30	.00117	1.33575	2.3345
36.	99.8333	2720.4	.21800	477.0030	.00307	264.04	648.95	.00114	1.33350	2.0551
38.	99.2193	2773.5	.21276	468.2939	.00310	263.29	565.12	.00111	1.33125	1.8428
40.	98.6048	2817.6	.20837	459.5205	.00312	261.99	499.99	.00109	1.32900	1.6762
42.	97.9899	2857.7	.20431	450.7152	.00314	260.21	448.40	.00107	1.32676	1.5458
44.	97.3745	2896.3	.20035	441.9079	.00316	258.13	406.84	.00104	1.32451	1.4429
46.	96.7587	2942.9	.19569	433.1268	.00318	255.84	372.86	.00102	1.32227	1.3651
48.	96.1426	2981.9	.19169	424.3983	.00321	253.41	344.72	.00099	1.32003	1.3001
50.	95.5262	3016.8	.18804	415.7470	.00323	250.87	321.14	.00097	1.31778	1.2463
52.	94.9095	3048.0	.18468	407.1958	.00325	248.26	301.17	.00095	1.31554	1.2015
54.	94.2927	3075.8	.18160	398.7661	.00327	245.61	284.10	.00093	1.31330	1.1638
56.	93.6758	3099.8	.17881	390.4774	.00329	242.95	269.39	.00091	1.31107	1.1317
58.	93.0590	3119.1	.17637	382.3478	.00331	240.29	256.61	.00090	1.30883	1.1036
60.	92.4426	3137.1	.17403	374.3937	.00333	237.97	245.43	.00089	1.30660	1.0785
65.	90.9041	3180.6	.16835	355.3682	.00338	233.25	222.87	.00086	1.30105	1.0267
70.	89.3730	3225.6	.16270	337.7071	.00341	228.47	205.89	.00084	1.29553	.9925
75.	87.8545	3275.1	.15697	321.5186	.00344	223.75	192.71	.00081	1.29008	.9698
80.	86.3545	3331.0	.15114	306.8348	.00345	219.32	182.23	.00080	1.28471	.9543
85.	84.8790	3394.7	.14520	293.6117	.00344	218.74	173.71	.00079	1.27943	.9283
90.	83.4336	3466.3	.13922	281.7316	.00342	217.96	166.66	.00079	1.27428	.9076
95.	82.0230	3542.8	.13337	271.0114	.00339	217.14	160.73	.00079	1.26927	.8901
100.	80.4651	3595.2	.13095	261.4332	.00343	215.80	154.96	.00078	1.26375	.8853
110.	77.8046	3782.4	.11979	244.1023	.00337	204.93	107.00	.00074	1.25435	.6657
120.	75.2353	3964.0	.11162	230.8886	.00330	201.01	107.28	.00074	1.24532	.6977
140.	70.5036	4347.3	.09814	210.1927	.00314	216.04	108.51	.00081	1.22680	.6851
160.	66.3292	4712.9	.08689	192.0795	.00298	237.98	109.71	.00092	1.21435	.6472
180.	62.5400	4953.2	.07936	173.2180	.00293	256.95	110.71	.00102	1.20132	.6263
200.	59.0710	5294.8	.07396	163.4613	.00281	270.13	111.63	.00111	1.18948	.6140
220.	55.9659	5744.0	.06932	159.4606	.00261	277.80	112.59	.00119	1.17895	.6069
240.	53.1923	6131.3	.06533	153.7984	.00246	281.37	113.70	.00126	1.16960	.6089
260.	50.7026	6474.3	.06209	147.9087	.00234	282.42	114.97	.00132	1.15124	.6171
280.	48.4373	6813.4	.05949	143.0900	.00223	282.20	116.44	.00138	1.15368	.6279
300.	46.2315	6953.3	.06079	139.9443	.00217	281.60	118.09	.00145	1.14634	.6338
350.	41.7167	7734.5	.05702	132.5354	.00194	281.43	122.91	.00161	1.13143	.6570
400.	38.0322	8492.9	.05440	127.0413	.00176	284.99	128.50	.00180	1.11936	.6740
450.	34.9644	9237.3	.05245	122.7753	.00161	292.12	134.60	.00202	1.10938	.6847
500.	32.3671	9980.5	.05088	119.3503	.00148	301.94	141.02	.00227	1.10098	.6910
550.	30.1370	10719.4	.04962	116.5315	.00138	313.67	147.64	.00254	1.09380	.6942
600.	28.1996	11460.9	.04854	114.1675	.00128	326.72	154.37	.00283	1.08759	.6954
650.	26.4995	12205.1	.04761	112.1557	.00120	340.73	161.15	.00315	1.08216	.6955
700.	24.9947	12958.8	.04676	110.4230	.00114	355.43	167.94	.00348	1.07737	.6950
750.	23.6529	13721.0	.04598	108.9160	.00107	370.66	174.73	.00383	1.07311	.6942
800.	22.4485	14495.1	.04526	107.5944	.00102	386.31	181.48	.00420	1.06930	.6933
850.	21.3612	15283.0	.04456	106.4271	.00097	402.32	188.20	.00458	1.06586	.6925
900.	20.3744	16086.2	.04389	105.3896	.00092	418.63	194.86	.00498	1.06276	.6917
950.	19.4748	16905.6	.04324	104.4622	.00088	435.20	201.48	.00539	1.05993	.6912
1000.	18.6513	17742.0	.04260	103.6291	.00085	452.01	208.05	.00581	1.05734	.6907
1100.	17.1965	19452.7	.04141	102.1959	.00078	475.56	221.01	.00656	1.05279	.7053
1200.	15.9516	21225.1	.04027	101.0104	.00072	511.00	233.74	.00750	1.04890	.7030
1300.	14.8743	23057.7	.03920	100.0161	.00068	546.88	246.26	.00850	1.04554	.7014
1400.	13.9327	24946.6	.03819	99.1723	.00063	583.15	258.57	.00954	1.04262	.7004
1500.	13.1029	26886.3	.03725	98.4487	.00060	619.71	270.67	.01063	1.04004	.6996
1600.	12.3659	28852.5	.03640	97.8224	.00056	656.09	282.57	.01177	1.03776	.6991
1700.	11.7071	30852.9	.03562	97.2758	.00053	692.50	294.27	.01295	1.03572	.6986
1800.	11.1146	32885.2	.03491	96.7950	.00051	728.98	305.78	.01419	1.03389	.6982
2000.	10.0923	37049.9	.03362	95.9893	.00046	802.71	328.23	.01680	1.03074	.6969
2200.	9.2412	41421.8	.03241	95.3389	.00042	880.16	344.88	.01964	1.02812	.6842
2400.	8.5210	46094.3	.03121	94.7961	.00039	965.40	366.19	.02274	1.02591	.6802
2600.	7.9027	51241.0	.02992	94.3223	.00036	1065.06	387.03	.02621	1.02402	.6727
2800.	7.3648	57096.2	.02849	93.8833	.00034	1187.82	407.48	.03015	1.02237	.6607
3000.	6.8906	63938.3	.02687	93.4458	.00032	1343.93	427.66	.03469	1.02092	.6441

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

100.00 MPA ISOBAR

TEMPERATURE K	VOLUME CU M/KG	ISOTHERM DERIVATIVE CU M-MPA/KG	ISOCHORE DERIVATIVE MPA/K	INTERNAL ENERGY KJ/KG-K	ENTHALPY KJ/KG	ENTROPY KJ/KG-K	CV KJ / KG-K	CP	VELOCITY OF SOUND M/S
* 34.169	.00977	5.2095	1.542	360.9	1337.6	15.394	6.59	8.08	2527.
36.	.00982	5.1618	1.526	370.7	1352.6	15.822	6.73	8.30	2522.
38.	.00988	5.1078	1.508	381.8	1369.4	16.277	6.87	8.52	2517.
40.	.00993	5.0520	1.490	393.2	1386.6	16.719	6.98	8.71	2512.
42.	.00999	4.9948	1.472	405.0	1404.2	17.148	7.07	8.89	2506.
44.	.01005	4.9365	1.453	417.0	1422.2	17.566	7.17	9.07	2499.
46.	.01011	4.8773	1.434	428.9	1440.0	17.961	7.30	9.28	2491.
48.	.01017	4.8175	1.415	441.6	1458.8	18.360	7.40	9.46	2482.
50.	.01023	4.7573	1.396	454.5	1477.8	18.750	7.49	9.64	2474.
52.	.01029	4.6971	1.377	467.8	1497.3	19.131	7.57	9.80	2465.
54.	.01036	4.6369	1.359	481.3	1517.0	19.504	7.65	9.95	2457.
56.	.01042	4.5771	1.340	495.3	1537.3	19.874	7.71	10.09	2448.
58.	.01048	4.5178	1.321	509.2	1557.6	20.231	7.75	10.22	2440.
60.	.01055	4.4591	1.302	523.3	1578.2	20.579	7.80	10.34	2431.
65.	.01071	4.3169	1.255	559.2	1630.6	21.416	7.89	10.62	2410.
70.	.01088	4.1826	1.209	596.1	1684.4	22.214	7.99	10.89	2387.
75.	.01106	4.0581	1.162	633.8	1739.4	22.973	8.09	11.14	2364.
80.	.01123	3.9448	1.116	672.5	1795.8	23.700	8.19	11.38	2341.
85.	.01141	3.8431	1.070	711.9	1853.2	24.397	8.30	11.60	2317.
90.	.01160	3.7530	1.024	752.2	1911.7	25.067	8.42	11.80	2294.
95.	.01178	3.6737	.9796	793.2	1971.2	25.709	8.53	11.98	2271.
100.	.01197	3.6035	.9357	834.9	2031.5	26.327	8.66	12.13	2248.
110.	.01234	3.4819	.8522	922.1	2155.8	27.511	8.98	12.47	2199.
120.	.01276	3.3346	.8066	1011.2	2287.3	28.656	9.22	13.03	2171.
140.	.01355	3.1987	.7030	1198.0	2553.0	30.703	9.68	13.65	2124.
160.	.01437	3.1972	.6180	1394.3	2831.2	32.560	10.07	14.02	2109.
180.	.01517	3.1143	.5439	1597.5	3114.2	34.226	10.39	14.33	2072.
200.	.01597	2.9502	.4914	1806.0	3403.4	35.749	10.64	14.82	2027.
220.	.01684	2.9419	.4488	2019.3	3703.3	37.179	10.84	15.11	2025.
240.	.01768	3.0865	.4119	2236.5	4004.7	38.491	11.00	15.12	2060.
260.	.01852	3.1323	.3779	2456.3	4307.9	39.705	11.12	15.18	2068.
280.	.01934	3.1686	.3488	2677.7	4611.7	40.831	11.21	15.23	2075.
300.	.02024	3.2500	.3354	2874.6	4898.1	41.788	10.88	15.14	2126.
350.	.02234	3.3883	.2846	3419.5	5653.5	44.118	10.89	15.07	2165.
400.	.02443	3.5426	.2470	3961.9	6404.6	46.124	10.86	14.97	2210.
450.	.02650	3.7063	.2182	4501.0	7151.0	47.882	10.82	14.88	2257.
500.	.02856	3.8759	.1955	5037.2	7893.4	49.446	10.79	14.81	2306.
550.	.03061	4.0497	.1771	5571.1	8632.6	50.855	10.77	14.76	2356.
600.	.03266	4.2264	.1620	6103.8	9369.9	52.135	10.76	14.73	2406.
650.	.03470	4.4055	.1493	6635.5	10105.9	53.310	10.75	14.71	2455.
700.	.03674	4.5866	.1385	7167.4	10841.7	54.407	10.76	14.72	2504.
750.	.03878	4.7694	.1291	7700.1	11578.1	55.425	10.79	14.73	2552.
800.	.04082	4.9536	.1210	8234.0	12315.5	56.377	10.82	14.76	2599.
850.	.04285	5.1393	.1139	8769.9	13054.9	57.273	10.87	14.80	2646.
900.	.04488	5.3261	.1076	9308.2	13796.6	58.120	10.92	14.86	2692.
950.	.04692	5.5140	.1019	9849.4	14541.2	58.924	10.99	14.93	2737.
1000.	.04895	5.7030	.0968	10393.9	15289.2	59.690	11.06	15.01	2781.
1100.	.05302	6.0838	.0881	11496.2	16798.6	61.118	11.23	15.17	2867.
1200.	.05710	6.4678	.0808	12616.8	18326.5	62.440	11.41	15.37	2951.
1300.	.06117	6.8546	.0747	13757.2	19874.4	63.678	11.61	15.57	3032.
1400.	.06525	7.2439	.0694	14918.2	21443.4	64.848	11.83	15.79	3110.
1500.	.06933	7.6353	.0649	16100.4	23033.8	65.959	12.04	16.01	3186.
1600.	.07342	8.0286	.0609	17302.8	24644.6	66.992	12.25	16.23	3261.
1700.	.07751	8.4236	.0573	18526.2	26276.8	67.977	12.45	16.44	3335.
1800.	.08160	8.8200	.0542	19770.4	27930.0	68.921	12.65	16.64	3406.
2000.	.08978	9.6165	.0489	22320.2	31298.6	70.706	13.03	17.04	3546.
2200.	.09798	10.4171	.0445	24943.7	34742.1	72.339	13.43	17.45	3679.
2400.	.10620	11.2210	.0408	27651.8	38272.3	73.870	13.87	17.91	3807.
2600.	.11446	12.0275	.0377	30460.2	41905.8	75.323	14.40	18.48	3929.
2800.	.12276	12.8363	.0351	33394.0	45670.1	76.723	15.06	19.20	4045.
3000.	.13115	13.6469	.0328	36488.4	49603.8	78.089	15.91	20.14	4156.

* TWO-PHASE BOUNDARY

TABLE 8

THERMODYNAMIC PROPERTIES OF NORMAL HYDROGEN (ISOBARS, SI UNITS)

100.00 MPA ISOBAR

TEMPERATURE K	DENSITY KG/CU M	$V(DH/DV)_P$ KJ/KG	$V(DP/DU)_V$ MPA-CU M/KJ X 10^2	$-V(DP/DV)_T$ MPA	$(DV/DT)_P/V$ 1/K	THERMAL CONDUCTIVITY W/K-M X 10^3	VISCOSITY KG/M-S X 10^7	THERMAL DIFFUSIVITY SQ M/HR	DIELECTRIC CONSTANT	PRANDTL NUMBER
* 34.169	102.3875	2795.8	.22835	533.3893	.00289	276.26	937.81	.00120	1.34287	2.7431
36.	101.8460	2858.7	.22256	525.7090	.00290	276.26	800.91	.00118	1.34088	2.4058
38.	101.2550	2920.6	.21694	517.1855	.00292	275.52	687.46	.00115	1.33871	2.1254
40.	100.6647	2972.7	.21222	508.5564	.00293	274.20	600.50	.00113	1.33655	1.9077
42.	100.0751	3020.5	.20787	499.8546	.00294	272.37	532.43	.00110	1.33439	1.7385
44.	99.4861	3066.5	.20366	491.1104	.00296	270.22	478.19	.00108	1.33223	1.6055
46.	98.8978	3120.9	.19876	482.3525	.00297	267.84	434.26	.00105	1.33008	1.5045
48.	98.3099	3167.1	.19456	473.6076	.00299	265.30	398.20	.00103	1.32793	1.4205
50.	97.7226	3208.6	.19074	464.9006	.00300	262.66	368.22	.00100	1.32578	1.3511
52.	97.1359	3246.1	.18723	456.2550	.00302	259.94	343.02	.00098	1.32364	1.2933
54.	96.5496	3279.6	.18402	447.6927	.00303	257.18	321.63	.00096	1.32151	1.2447
56.	95.9639	3308.8	.18113	439.2340	.00305	254.40	303.31	.00095	1.31937	1.2034
58.	95.3788	3332.7	.17861	430.8979	.00307	251.62	287.50	.00093	1.31725	1.1674
60.	94.7943	3355.1	.17619	422.7017	.00308	249.19	273.74	.00092	1.31512	1.1354
65.	93.3370	3408.0	.17038	402.9244	.00312	244.27	246.24	.00089	1.30984	1.0705
70.	91.8870	3461.0	.16466	384.3249	.00315	239.28	225.80	.00086	1.30459	1.0273
75.	90.4480	3517.6	.15891	367.0497	.00317	234.35	210.14	.00084	1.29940	.9989
80.	89.0241	3580.0	.15308	351.1813	.00318	229.72	197.82	.00082	1.29428	.9798
85.	87.6203	3650.1	.14713	336.7366	.00318	229.10	187.92	.00081	1.28924	.9514
90.	86.2414	3728.6	.14112	323.6679	.00317	228.27	179.81	.00081	1.28430	.9296
95.	84.8920	3813.3	.13521	311.8664	.00314	227.38	173.06	.00081	1.27948	.9116
100.	83.5760	3905.6	.12934	301.1690	.00311	226.60	167.36	.00080	1.27479	.8962
110.	81.0536	4129.9	.11711	282.2177	.00302	210.81	109.58	.00075	1.26583	.6483
120.	78.3682	4220.7	.11169	261.3250	.00309	206.59	110.23	.00073	1.25634	.6951
140.	73.7994	4582.8	.09844	236.0605	.00298	224.30	112.16	.00080	1.24029	.6825
160.	69.5909	5047.0	.08817	222.4929	.00278	250.99	113.90	.00093	1.22563	.6361
180.	65.9363	5409.2	.07936	205.3481	.00265	275.13	115.24	.00105	1.21299	.6000
200.	62.6024	5569.0	.07378	184.6887	.00266	292.72	116.31	.00114	1.20154	.5888
220.	59.3817	5881.1	.06974	174.6977	.00257	303.35	117.30	.00122	1.19054	.5843
240.	56.5559	6408.2	.06623	174.5602	.00236	308.35	118.33	.00130	1.18095	.5803
260.	54.0061	6795.8	.06294	169.1637	.00223	309.51	119.47	.00136	1.17234	.5860
280.	51.7071	7152.7	.06019	163.8406	.00213	308.46	120.77	.00141	1.16461	.5961
300.	49.4193	7247.8	.06236	160.6133	.00209	306.42	122.22	.00147	1.15695	.6038
350.	44.7643	8031.9	.05835	151.6740	.00188	301.62	126.54	.00161	1.14148	.6322
400.	40.9388	8792.6	.05553	145.0297	.00170	300.72	131.66	.00177	1.12888	.6555
450.	37.7361	9539.0	.05343	139.8609	.00156	304.27	137.36	.00195	1.11840	.6718
500.	35.0120	10284.1	.05173	135.7041	.00144	311.38	143.44	.00216	1.10953	.6824
550.	32.6639	11024.5	.05036	132.2775	.00134	321.09	149.78	.00240	1.10193	.6886
600.	30.6169	11767.1	.04919	129.3991	.00125	332.64	156.27	.00266	1.09534	.6920
650.	28.8152	12512.1	.04818	126.9455	.00118	345.52	162.85	.00293	1.08956	.6934
700.	27.2161	13266.4	.04726	124.8291	.00111	359.37	169.47	.00323	1.08444	.6939
750.	25.7866	14028.9	.04643	122.9859	.00105	373.95	176.11	.00354	1.07989	.6938
800.	24.5007	14803.2	.04565	121.3674	.00100	389.09	182.74	.00387	1.07580	.6933
850.	23.3373	15591.1	.04491	119.9362	.00095	404.69	189.35	.00422	1.07211	.6927
900.	22.2795	16394.3	.04420	118.6628	.00091	420.68	195.92	.00457	1.06876	.6921
950.	21.3135	17213.7	.04352	117.5236	.00087	436.99	202.46	.00494	1.06571	.6916
1000.	20.4277	18050.0	.04285	116.4995	.00083	453.58	208.95	.00533	1.06292	.6912
1100.	18.8595	19760.5	.04161	114.7366	.00077	475.56	221.79	.00598	1.05799	.7077
1200.	17.5141	21532.6	.04044	113.2774	.00071	511.00	234.43	.00684	1.05378	.7049
1300.	16.3472	23364.8	.03934	112.0534	.00067	546.88	246.87	.00773	1.05013	.7030
1400.	15.3253	25253.6	.03830	111.0148	.00063	583.15	259.11	.00867	1.04695	.7017
1500.	14.4231	27193.1	.03734	110.1246	.00059	619.71	271.16	.00966	1.04414	.7007
1600.	13.6206	29158.7	.03648	109.3547	.00056	656.08	283.01	.01069	1.04165	.7000
1700.	12.9023	31158.4	.03569	108.6833	.00053	692.48	294.67	.01176	1.03942	.6994
1800.	12.2556	33189.5	.03496	108.0935	.00050	728.94	306.15	.01287	1.03742	.6989
2000.	11.1379	37349.7	.03366	107.1068	.00046	802.55	328.54	.01523	1.03397	.6974
2200.	10.2057	41711.4	.03245	106.3132	.00042	879.65	344.88	.01778	1.03109	.6842
2400.	9.4158	46361.9	.03126	105.6544	.00039	964.08	366.19	.02058	1.02866	.6805
2600.	8.7370	51465.7	.02999	105.0844	.00036	1062.11	387.03	.02368	1.02657	.6734
2800.	8.1459	57245.9	.02859	104.5631	.00034	1182.01	407.47	.02721	1.02476	.6619
3000.	7.6246	63967.6	.02702	104.0528	.00031	1333.50	427.63	.03126	1.02316	.6460

* TWO-PHASE BOUNDARY

Table 9

THERMODYNAMIC PROPERTIES OF COEXISTING GASEOUS AND LIQUID NORMAL HYDROGEN

Temperature, K	Density, kg/m³	$V(\partial H/\partial V)_P$, kJ/kg	$V(\partial P/\partial U)_V$, MPa-m³/kJ × 10²	$-V(\partial P/\partial V)_T$, MPa	$(\partial V/\partial T)_P/V$, 1/K	Thermal conductivity W/K-m × 10³	Viscosity, kg/m-s × 10⁷	Thermal diffusivity, m²/h	Dielectric constant	Prandtl number
13.950[a]	77.0235	622.6	0.25654	90.3401	0.01022	72.59	255.05	0.00053	1.25160	2.2359
	0.1254	139.8	0.06684	0.0069	0.07523	12.43	7.36	0.03395	1.00038	0.6230
14	76.8554	619.2	0.25480	88.3211	0.01046	74.62	248.01	0.00054	1.25101	2.1517
	0.1388	141.6	0.06684	0.0077	0.07441	12.54	7.48	0.03084	1.00042	0.6291
15	75.9963	621.9	0.24237	81.5880	0.01111	83.02	217.84	0.00057	1.24799	1.8128
	0.2228	150.5	0.06683	0.0131	0.07089	13.08	8.08	0.01981	1.00067	0.6591
16	75.1030	623.0	0.23130	75.3083	0.01181	88.86	194.15	0.00058	1.24486	1.6074
	0.3385	159.1	0.06680	0.0208	0.06820	13.66	8.68	0.01339	1.00102	0.6891
17	74.1710	613.1	0.22244	68.0612	0.01286	92.71	175.07	0.00057	1.24159	1.4884
	0.4922	167.1	0.06674	0.0313	0.06624	14.27	9.28	0.00943	1.00148	0.7197
18	73.1950	604.3	0.21509	61.7874	0.01394	95.43	159.34	0.00056	1.23818	1.4063
	0.6902	174.6	0.06669	0.0452	0.06495	14.97	9.88	0.00689	1.00208	0.7484
19	72.1693	601.0	0.20874	56.9619	0.01486	97.00	146.10	0.00054	1.23460	1.3451
	0.9395	181.4	0.06665	0.0626	0.06427	15.72	10.49	0.00517	1.00283	0.7783
20	71.0870	596.1	0.20314	52.3516	0.01585	98.40	134.76	0.00053	1.23083	1.2942
	1.2474	187.6	0.06666	0.0840	0.06420	16.64	11.11	0.00399	1.00376	0.8042
20.390[a]	70.7864	587.9	0.20176	50.2079	0.01644	98.92	131.98	0.00052	1.22978	1.2893
	1.3378	189.1	0.06667	0.0903	0.06424	16.94	11.29	0.00375	1.00404	0.8091
21	69.9403	577.8	0.19814	46.2935	0.01754	100.05	124.87	0.00051	1.22684	1.2648
	1.6189	193.0	0.06672	0.1093	0.06471	17.79	11.28	0.00317	1.00489	0.8241
22	68.7200	563.1	0.19347	41.1835	0.01921	100.95	116.11	0.00049	1.22261	1.2444
	2.0711	197.5	0.06686	0.1388	0.06597	19.02	12.38	0.00254	1.00625	0.8481
23	67.4149	540.5	0.18882	35.4854	0.02162	101.20	108.22	0.00046	1.21810	1.2499
	2.6119	201.2	0.06708	0.1719	0.06804	20.36	13.04	0.00205	1.00789	0.8769

[a] Two-phase boundary.

Table 9 (continued)
THERMODYNAMIC PROPERTIES OF COEXISTING GASEOUS AND LIQUID NORMAL HYDROGEN

Temperature, K	Density, kg/m³	$V(\partial H/\partial V)_p$, kJ/kg	$V(\partial P/\partial U)_V$, MPa-m³/kJ × 10²	$-V(\partial P/\partial V)_T$, MPa	$(\partial V/\partial T)_p/V$, 1/K	Thermal conductivity W/K-m × 10³	Viscosity, kg/m-s × 10⁷	Thermal diffusivity, m²/h	Dielectric constant	Prandtl number
24	66.0112	523.0	0.18378	30.8574	0.02394	100.84	101.01	0.00044	1.21325	1.2543
	3.2548	203.9	0.06739	0.2081	0.07108	21.81	13.73	0.00166	1.00984	0.9123
25	64.4917	504.2	0.17820	26.4945	0.02665	99.93	94.32	0.00042	1.20802	1.2682
	4.0171	205.8	0.06777	0.2460	0.07540	23.43	14.44	0.00135	1.01216	0.9567
26	62.8337	475.1	0.17151	21.4244	0.03116	98.43	88.03	0.00038	1.20233	1.3240
	4.9215	206.9	0.06822	0.2842	0.08144	25.24	15.19	0.00110	1.01491	1.0145
27	61.0065	451.1	0.16381	17.4346	0.03585	96.38	82.02	0.00035	1.19608	1.3764
	5.9999	207.3	0.06868	0.3201	0.09002	27.36	16.00	0.00088	1.01820	1.0916
28	58.9665	418.4	0.15535	13.1188	0.04416	93.78	76.19	0.00031	1.18913	1.5012
	7.2979	207.1	0.06912	0.3498	0.10259	29.91	16.89	0.00069	1.02216	1.1997
29	56.6460	382.6	0.14600	9.1967	0.05763	90.55	70.42	0.00026	1.18125	1.7146
	8.8866	206.2	0.06947	0.3676	0.12220	33.18	17.91	0.00053	1.02703	1.3601
30	53.9303	350.6	0.13555	6.2743	0.07585	86.57	64.57	0.00022	1.17208	1.9834
	10.8872	204.7	0.06965	0.3638	0.15631	37.87	19.17	0.00039	1.03319	1.6195
31	50.5892	310.8	0.12321	3.5282	0.11759	85.85	58.40	0.00017	1.16087	2.4864
	13.5411	202.6	0.06952	0.3205	0.22979	46.48	20.89	0.00027	1.04140	2.0930
32	45.9927	265.8	0.10745	1.3886	0.24599	91.46	51.31	0.00011	1.14555	3.6672
	17.4983	199.1	0.06953	0.2258	0.43710	66.77	23.79	0.00016	1.05373	3.1004
33.180[a]	31.4285	199.0					35.43		1.09795	

[a] Two-phase boundary.

Table 9 (continued)

THERMODYNAMIC PROPERTIES OF COEXISTING GASEOUS AND LIQUID NORMAL HYDROGEN

Temperature, K	Pressure, MPa	Isotherm derivative, m^3-MPa/kg	Isochore derivative, MPa/K	Internal energy, kJ/kg-K	Enthalpy, kJ/kg	Entropy, kJ/kg-K	C_v, kJ/kg-K	C_p, kJ/kg-K	Velocity of sound, m/s	Surface tension, N/m × 10^3
13.950[a]	0.0072	1.1729	0.9234	218.2	218.3	14.079	4.67	6.36	1264	3.0033
	0.0072	0.0552	0.0005	611.4	667.4	46.635	6.21	10.52	306	
14	0.0074	1.1492	0.9234	219.5	219.6	14.173	4.72	6.47	1256	2.9950
	0.0074	0.0558	0.0006	612.5	669.3	46.301	6.21	10.54	308	
15	0.0127	1.0736	0.9064	226.3	226.4	14.640	4.92	6.91	1228	2.8290
	0.0127	0.0588	0.0009	617.9	678.2	44.763	6.24	10.67	317	
16	0.0204	1.0027	0.8893	233.5	233.8	15.104	5.12	7.36	1200	2.6635
	0.0204	0.0615	0.0014	623.0	686.7	43.418	6.27	10.85	326	
17	0.0314	0.9176	0.8750	241.1	241.6	15.568	5.30	7.88	1168	2.4987
	0.0314	0.0637	0.0021	627.8	694.7	42.227	6.32	11.07	334	
18	0.0461	0.8441	0.8612	249.2	249.9	16.032	5.47	8.42	1140	2.3346
	0.0461	0.0654	0.0029	632.2	702.1	41.158	6.37	11.34	341	
19	0.0654	0.7893	0.8465	257.8	258.8	16.498	5.62	8.93	1120	2.1712
	0.0654	0.0667	0.0040	636.3	708.8	40.188	6.43	11.66	348	
20	0.0901	0.7364	0.8300	266.9	268.3	16.966	5.75	9.45	1100	2.0085
	0.0901	0.0674	0.0054	639.8	714.8	39.299	6.49	12.04	354	
20.390[a]	0.1013	0.7093	0.8253	269.5	270.9	17.093	5.78	9.66	1089	1.9453
	0.1013	0.0675	0.0058	640.7	716.3	39.083	6.50	12.15	355	
21	0.1208	0.6619	0.8119	276.6	278.4	17.440	5.86	10.13	1070	1.8466
	0.1208	0.0675	0.0071	643.0	720.2	38.485	6.55	12.49	359	
22	0.1585	0.5993	0.7913	286.8	289.2	17.919	5.95	10.82	1044	1.6856
	0.1585	0.0670	0.0092	645.5	724.4	37.710	6.61	13.03	363	
23	0.2039	0.5264	0.7673	297.7	300.8	18.405	6.03	11.69	1010	1.5255
	0.2039	0.0658	0.0117	647.4	727.6	36.973	6.68	13.69	367	

[a] Two-phase boundary.

Table 9 (continued)

THERMODYNAMIC PROPERTIES OF COEXISTING GASEOUS AND LIQUID NORMAL HYDROGEN

Temperature, K	Pressure, MPa	Isotherm derivative, m^3-MPa/kg	Isochore derivative, MPa/K	Internal energy, kJ/kg-K	Enthalpy, kJ/kg	Entropy, kJ/kg-K	C_V, kJ/kg-K	C_P, kJ/kg-K	Velocity of sound, m/s	Surface tension, N/m × 10^3
24	0.2579	0.4675	0.7389	309.3	313.3	18.901	6.09	12.52	980	1.3664
	0.2579	0.0639	0.0148	648.5	729.8	36.266	6.74	14.49	371	
25	0.3213	0.4108	0.7060	321.6	326.7	19.408	6.14	13.44	948	1.2085
	0.3213	0.0613	0.0186	648.9	730.7	35.579	6.81	15.52	373	
26	0.3950	0.3410	0.6676	334.8	341.2	19.929	6.20	14.80	903	1.0518
	0.3950	0.0578	0.0231	648.2	730.2	34.900	6.89	16.85	376	
27	0.4800	0.2858	0.6251	349.0	357.0	20.473	6.26	16.17	860	0.8965
	0.4800	0.0533	0.0288	646.5	728.0	34.221	6.99	18.66	377	
28	0.5770	0.2225	0.5794	364.4	374.3	21.041	6.33	18.48	806	0.7429
	0.5770	0.0479	0.0359	643.2	723.7	33.524	7.11	21.24	378	
29	0.6872	0.1624	0.5300	381.2	393.6	21.650	6.41	22.05	747	0.5912
	0.6872	0.0414	0.0449	638.1	716.6	32.795	7.28	25.19	378	
30	0.8116	0.1163	0.4759	400.2	415.4	22.315	6.51	26.59	689	0.4418
	0.8116	0.0334	0.0569	630.4	705.9	32.002	7.50	31.99	378	
31	0.9510	0.0697	0.4149	422.3	441.3	23.075	6.66	36.55	619	0.2955
	0.9510	0.0237	0.0736	618.6	689.7	31.091	7.82	46.56	375	
32	1.1068	0.0302	0.3416	450.4	474.7	24.032	6.91	65.37	534	0.1537
	1.1068	0.0129	0.0987	599.2	663.2	29.926	8.11	87.02	372	
33.180[a]	1.3130		0.1898	524.3	565.4	26.680				0.0000

[a] Two-phase boundary.

Table 10
FIXED POINT PROPERTIES OF NORMAL HYDROGEN

Properties	Conditions								
	Triple point			Normal boiling point		Critical point[a]	Standard conditions		References and notes[b]
	Solid	Liquid	Vapor	Liquid	Vapor		STP(0°C)	NTP(20°C)	
Temperature (K)	13.957[c]	13.957[c]	13.957[c]	20.390[c]		33.19[c]	273.15	293.15	110
Pressure (mm Hg)[m]	54.04	54.04	54.04	760		9865	760	760	110
Density (mol/cm³) × 10³	43.01[133]	38.30	0.0644	35.20	0.6604	14.94	0.04460	0.04155	110,132
Specific volume (cm³/mol) × 10⁻³	0.02325[133]	0.026108	15.519	0.028409	1.5143	0.066949	22.423	24.066	110,132
Compressibility factor, $Z = \frac{PV}{RT}$	–	0.001621	0.9635	0.01698	0.9051	0.3191	1.00042	1.00049	[d]
Heats of fusion and vaporization (J/mol)	117.1	911.3		899.1		0	–	–	129[e]
Specific heat (J/mol-K)									
C_σ, at saturation	5.73	13.85	-46.94	18.91	-33.28	(Very large)	–	–	110,134
C_p, at constant pressure	–	13.23	21.22	19.70	24.60	(Very large)	28.59	28.89	110,132,134
C_v, at constant volume	–	9.53	12.52	11.60	13.2	(19.7)	20.30	20.40	110,132,134,
Specific heat ratio, $\gamma = C_p/C_v$	–	1.388	1.695	1.698	1.863	(Large)	1.408	1.416	[f]
Enthalpy (J/mol)	321.6	438.7	1350.0	548.3	1447.4	1164	7749.2	8324.1	110,132[g]
Internal energy (J/mol)	317.9[f]	435.0	1234.8	545.7	1294.0	–	5477.1	5885.4	110,132[g]
Entropy (J/mol-K)	20.3	28.7	93.6	34.92	78.94	54.57	139.59	141.62	110,132[g]
Velocity of sound (m/s)	–	1282	307	1101	357	–	1246	1294	134,138
Viscosity, μ									
N-s/m² × 10³	–	0.026	0.00074	0.0132	0.0011	(0.0035)	0.00839	0.00881	138
Centipoise[h]	–	0.026	0.00074	0.0132	0.0011	(0.0035)	0.00839	0.00881	138
Thermal conductivity (mW/cm-K), k	9.0[135]	0.73	0.124	0.99	0.169	[i]	1.740	1.838	134,136
Prandtl number, $N_{pr} = \mu C_p/k$	–	2.24	0.623	1.29	0.809	–	0.6849	0.6848	
Dielectric constant, ϵ	1.287	1.253	1.00039	1.231	1.0040	1.0937	1.000271	1.000253	131
Index of refraction,[j] $n = \sqrt{\epsilon}$	1.134	1.119	1.000196	1.1093	1.0020	1.0458	1.000136	1.000126	[k]
Surface tension (N/m) × 10³	–	3.00	–	1.94	–	0	–	–	123
Equiv. vol./vol. liquid at NBT	0.8184	0.9190	546.3	1	53.30	2.357	789.3	847.1	[ℓ]

Note: Gas constant – $R = 8.31434\ J \cdot mol^{-1} \cdot K^{-1}$; Molecular weight[111] = 2.01594; Mole = gram mole.

[a] Values in parentheses are estimates.

[b] Apply to all items on the line except for specific values separately referenced by superscript.

[c] These temperatures given in Reference 110 are based on the IPTS-1968 temperature scale. To compare with the corresponding temperatures given in Reference 4 for parahydrogen which are based on the NBS-1955 temperature scale, 0.01 K should be subtracted, i.e., use 13.947, 20.380, and 33.18 respectively for the triple point, normal boiling point, and critical point when determining property differences between normal and parahydrogen.

[d] Compressibility factor calculated from the tabulated data using the gas constant, R, from Reference 4.

[e] Heats of fusion and vaporization calculated from enthalpy differences and as reported in References 110, 129, 132.

[f] Calculated from property values given in this table.

[g] Base point (zero values) for enthalpy, internal energy, and entropy are 0 K for the ideal gas at 0.101325 MPa (1 atm) pressure.

[h] Units for poise are g/cm-s.

[i] Anomalously large.

[j] Long wavelengths.

[k] Index of refraction calculated from the dielectric constant data given in Reference 131, in good agreement with the values reported in Reference 114.

[ℓ] Ratio of specific volumes reported in References 3 and 4 or 110 and 132.

[m] (mmHg) x 1.3332 x 10^{-4} = MPa.

Table 11

VAPOR PRESSURE OF COEXISTING GASEOUS

AND LIQUID NORMAL HYDROGEN[127]

Temperature, K	Pressure, MPa
20.560	0.1064887
21	0.1207211
22	0.1581615
23	0.2033624
24	0.2571729
25	0.3204464
26	0.3940357
27	0.4787904
28	0.5755541
29	0.6851619
30	0.8084393
31	0.9462002
32	1.0992464
32.270	1.1432921

TABLE 12. THERMODYNAMIC PROPERTIES OF THE HYDROGEN SOLID-VAPOR TWO-PHASE REGION[a]

PRESS.	TEMP.	V-SOL.	D-SOL.	H-SOL.	S-SOL.	U-SOL.	C-SAT.	C-P[b]	ΔHSUB.	V-VAP.	D-VAP.	H-VAP.	S-VAP.	U-VAP.
ATM	K	CC/MOL	MOL/L	J/MOL	J/MOL-K	J/MOL	J/MOL-K	J/MOL-K	J/MOL	CC/MOL	MOL/L	J/MOL	J/MOL-K	J/MOL
.06950	13.8	23.30	42.911	-740.2	1.500	-740.4	5.634	5.640	1022.1	16030.	.06238	281.9	75.57	169.0
.06505	13.7	23.29	42.931	-740.8	1.459	-740.9	5.502	5.508	1021.0	17015.	.05877	280.2	75.98	168.1
.06084	13.6	23.28	42.950	-741.3	1.420	-741.5	5.371	5.377	1019.8	18074.	.05533	278.5	76.40	167.0
.05685	13.5	23.27	42.969	-741.8	1.380	-742.0	5.243	5.248	1018.5	19213.	.05205	276.7	76.83	166.0
.05308	13.4	23.26	42.989	-742.4	1.342	-742.5	5.117	5.122	1017.3	20441.	.04892	274.9	77.26	165.0
.04951	13.3	23.25	43.007	-742.9	1.304	-743.0	4.992	4.997	1016.0	21765.	.04594	273.1	77.69	163.9
.04614	13.2	23.24	43.026	-743.4	1.267	-743.5	4.870	4.874	1014.6	23194.	.04311	271.3	78.13	162.9
.04296	13.1	23.23	43.045	-743.8	1.230	-743.9	4.750	4.754	1013.3	24738.	.04042	269.5	78.58	161.8
.03996	13.0	23.22	43.063	-744.3	1.194	-744.4	4.631	4.635	1011.9	26407.	.03787	267.6	79.03	160.7
.03713	12.9	23.21	43.082	-744.8	1.159	-744.8	4.514	4.518	1010.5	28215.	.03544	265.7	79.49	159.6
.03447	12.8	23.20	43.100	-745.2	1.124	-745.3	4.400	4.403	1009.0	30173.	.03314	263.8	79.96	158.4
.03197	12.7	23.19	43.118	-745.6	1.090	-745.7	4.287	4.290	1007.6	32298.	.03096	261.9	80.43	157.3
.02962	12.6	23.18	43.135	-746.1	1.057	-746.1	4.176	4.179	1006.1	34606.	.02890	260.0	80.90	156.2
.02741	12.5	23.17	43.153	-746.5	1.024	-746.5	4.067	4.070	1004.5	37114.	.02694	258.1	81.39	155.0
.02534	12.4	23.16	43.170	-746.9	.992	-746.9	3.960	3.963	1003.0	39845.	.02510	256.1	81.88	153.8
.02340	12.3	23.15	43.188	-747.3	.960	-747.3	3.855	3.858	1001.4	42821.	.02335	254.2	82.38	152.6
.02158	12.2	23.15	43.205	-747.6	.929	-747.7	3.751	3.753	999.8	46067.	.02171	252.2	82.88	151.5
.01988	12.1	23.14	43.222	-748.0	.899	-748.1	3.650	3.652	998.2	49613.	.02016	250.2	83.40	150.3
.01830	12.0	23.13	43.238	-748.4	.869	-748.4	3.550	3.552	996.6	53491.	.01869	248.2	83.92	149.0
.01681	11.9	23.12	43.255	-748.7	.839	-748.8	3.452	3.454	994.9	57738.	.01732	246.2	84.45	147.8
.01543	11.8	23.11	43.271	-749.1	.811	-749.1	3.356	3.358	993.2	62395.	.01603	244.2	84.98	146.6
.01415	11.7	23.10	43.287	-749.4	.783	-749.4	3.261	3.263	991.5	67509.	.01481	242.1	85.53	145.4
.01295	11.6	23.09	43.303	-749.7	.755	-749.8	3.169	3.170	989.8	73131.	.01367	240.1	86.09	144.1
.01184	11.5	23.08	43.319	-750.0	.728	-750.1	3.078	3.079	988.1	79321.	.01261	238.1	86.65	142.9
.01081	11.4	23.08	43.335	-750.3	.701	-750.4	2.989	2.990	986.3	86146.	.01161	236.0	87.22	141.6
.00986	11.3	23.07	43.350	-750.6	.676	-750.7	2.901	2.902	984.6	93682.	.01067	233.9	87.81	140.4
.00898	11.2	23.06	43.366	-750.9	.650	-750.9	2.815	2.816	982.8	102017.	.00980	231.9	88.40	139.1
.00816	11.1	23.05	43.381	-751.2	.625	-751.2	2.731	2.732	981.0	111248.	.00899	229.8	89.00	137.8
.00741	11.0	23.04	43.396	-751.5	.601	-751.5	2.649	2.650	979.2	121489.	.00823	227.7	89.62	136.5
.00671	10.9	23.04	43.411	-751.7	.577	-751.7	2.568	2.569	977.3	132869.	.00753	225.6	90.24	135.3
.00607	10.8	23.03	43.425	-752.0	.554	-752.0	2.489	2.490	975.5	145535.	.00687	223.5	90.88	134.0
.00549	10.7	23.02	43.440	-752.2	.531	-752.2	2.412	2.412	973.6	159656.	.00626	221.4	91.52	132.7
.00495	10.6	23.01	43.454	-752.5	.509	-752.5	2.336	2.336	971.8	175429.	.00570	219.3	92.18	131.4
.00445	10.5	23.01	43.468	-752.7	.487	-752.7	2.262	2.262	969.9	193077.	.00518	217.2	92.86	130.1
.00400	10.4	23.00	43.482	-752.9	.466	-752.9	2.189	2.189	968.0	212861.	.00470	215.1	93.54	128.8
.00359	10.3	22.99	43.496	-753.1	.445	-753.1	2.118	2.118	966.1	235082.	.00425	213.0	94.24	127.5
.00321	10.2	22.98	43.509	-753.3	.424	-753.3	2.048	2.048	964.2	260087.	.00384	210.8	94.95	126.2
.00287	10.1	22.98	43.523	-753.5	.405	-753.5	1.980	1.980	962.2	288284.	.00347	208.7	95.68	124.9
.00256	10.0	22.97	43.536	-753.7	.385	-753.7	1.914	1.914	960.3	320146.	.00312	206.6	96.42	123.5

MM HG	K	CC/MOL[c]	CAL/MOL	CAL/MOL-K	CAL/MOL-K	CAL/MOL	Z, VAPOR[d]	CAL/MOL	CAL/MOL-K
.1917E+01	10.0	22.873	1.4790000	.1975000	.5751000	230.55	.99878	232.03	23.252
.5343E+00	9.0	22.809	.9788000	.1450000	.4280000	226.12	.99956	227.10	25.269
.1118E+00	8.0	22.754	.6139000	.1022000	.3054000	221.53	1.00000	222.15	27.794
.1561E-01	7.0	22.711	.3598000	.0684200	.2065000	216.82	1.00000	217.18	31.043
.1198E-02	6.0	22.678	.1933000	.0429100	.1301000	212.02	1.00000	212.21	35.379
.3570E-04	5.0	22.660	.0927500	.0247300	.0742000	207.15	1.00000	207.24	41.455
.2080E-06	4.0	22.650	.0379900	.0126600	.0379900	202.24	1.00000	202.28	50.572
.4832E-10	3.0	22.646	.0120200	.0053420	.0160300	197.30	1.00000	197.31	65.771
.3985E-17	2.0	22.645	.0023740	.0015830	.0047490	192.34	1.00000	192.34	96.170
.8255E-38	1.0	22.645	.0001484	.0001979	.0005936	187.37	1.00000	187.37	187.372

[a] Upper part of table from Reference 142, lower part of table from References 19, 129.

[b] Estimated from values and differences given in Reference 19.

[c] From Ahlers.[169] Mullins et al.[129] set this value constant.

[d] Z is compressibility factor.

Note: atm x 0.101325 = MPa; mmHg x 1.3332×10^{-4} = MPa; (cal/mol) x 2.0755 = J/g.

TABLE 13. THERMODYNAMIC PROPERTIES OF THE HYDROGEN SOLID-LIQUID TWO-PHASE REGION

PRESS.	TEMP.	V-SOL.	D-SOL.	H-SOL.	S-SOL.	U-SOL.	ΔHFUS.	V-LIQ.	D-LIQ.	H-LIQ.	S-LIQ.	U-LIQ.
ATM	K	CC/MOL	MOL/L	J/MOL	J/MOL-K	J/MOL	J/MOL	CC/MOL	MOL/L	J/MOL	J/MOL-K	J/MOL
.0695	13.8	23.30	42.911	-740.2	1.500	-740.4	117.3	26.17	38.214	-622.9	10.00	-623.1
5.976	14.0	23.27	42.972	-724.9	1.595	-739.0	118.4	26.07	38.354	-606.6	10.05	-622.4
11.982	14.2	23.23	43.048	-709.5	1.685	-737.7	119.5	25.97	38.502	-590.0	10.10	-621.6
18.087	14.4	23.18	43.137	-693.9	1.771	-736.4	120.6	25.87	38.657	-573.3	10.15	-620.7
24.288	14.6	23.13	43.237	-678.1	1.854	-735.1	121.8	25.76	38.816	-556.4	10.19	-619.8
30.585	14.8	23.07	43.346	-662.2	1.933	-733.7	122.9	25.65	38.980	-539.3	10.24	-618.8
36.976	15.0	23.01	43.462	-646.2	2.008	-732.4	124.1	25.55	39.146	-522.1	10.28	-617.8
43.459	15.2	22.94	43.584	-630.0	2.079	-731.1	125.3	25.44	39.314	-504.7	10.32	-616.8
50.033	15.4	22.88	43.710	-613.8	2.145	-729.7	126.5	25.33	39.483	-487.2	10.36	-615.6
56.69	15.6	22.81	43.840	-597.4	2.208	-728.4	127.7	25.22	39.652	-469.6	10.40	-614.5
63.45	15.8	22.74	43.971	-580.9	2.267	-727.1	129.0	25.11	39.821	-451.9	10.43	-613.3
70.29	16.0	22.67	44.104	-564.3	2.321	-725.8	130.2	25.01	39.989	-434.0	10.46	-612.1
77.22	16.2	22.60	44.238	-547.6	2.372	-724.4	131.5	24.90	40.155	-416.0	10.49	-610.9
84.23	16.4	22.54	44.372	-530.8	2.419	-723.1	132.8	24.80	40.319	-397.9	10.52	-609.6
91.33	16.6	22.47	44.506	-513.9	2.463	-721.8	134.1	24.70	40.482	-379.7	10.54	-608.3
98.51	16.8	22.40	44.639	-496.8	2.504	-720.5	135.5	24.60	40.643	-361.4	10.57	-607.0
105.78	17.0	22.34	44.772	-479.7	2.543	-719.2	136.8	24.51	40.801	-342.9	10.59	-605.6
113.13	17.2	22.27	44.903	-462.5	2.578	-717.8	138.2	24.42	40.957	-324.4	10.61	-604.3
120.56	17.4	22.21	45.034	-445.2	2.612	-716.5	139.5	24.32	41.111	-305.7	10.63	-602.8
128.07	17.6	22.14	45.163	-427.8	2.644	-715.1	140.9	24.23	41.263	-286.9	10.65	-601.4
135.66	17.8	22.08	45.292	-410.3	2.673	-713.8	142.3	24.15	41.412	-268.0	10.67	-599.9
143.33	18.0	22.02	45.419	-392.6	2.702	-712.4	143.7	24.06	41.559	-248.9	10.69	-598.4
151.07	18.2	21.96	45.545	-374.9	2.728	-711.0	145.2	23.98	41.704	-229.7	10.70	-596.8
158.90	18.4	21.90	45.670	-357.0	2.753	-709.6	146.6	23.90	41.847	-210.4	10.72	-595.2
166.80	18.6	21.84	45.793	-339.1	2.777	-708.2	148.1	23.82	41.988	-191.0	10.74	-593.5
174.78	18.8	21.78	45.916	-321.0	2.801	-706.7	149.6	23.74	42.127	-171.4	10.76	-591.8
182.83	19.0	21.72	46.037	-302.8	2.824	-705.2	151.0	23.66	42.264	-151.8	10.77	-590.1
190.96	19.2	21.66	46.158	-284.5	2.847	-703.7	152.5	23.59	42.400	-132.0	10.79	-588.3
199.17	19.4	21.61	46.277	-266.1	2.870	-702.2	154.1	23.51	42.533	-112.0	10.81	-586.5
207.44	19.6	21.55	46.396	-247.5	2.892	-700.6	155.6	23.44	42.666	-91.9	10.83	-584.6
215.79	19.8	21.50	46.514	-228.9	2.914	-699.0	157.1	23.37	42.796	-71.8	10.85	-582.7
224.22	20.0	21.45	46.631	-210.1	2.936	-697.3	158.7	23.30	42.925	-51.4	10.87	-580.7
232.71	20.2	21.39	46.747	-191.2	2.956	-695.7	160.3	23.23	43.053	-31.0	10.89	-578.7
241.28	20.4	21.34	46.863	-172.3	2.976	-694.0	161.8	23.16	43.180	-10.4	10.91	-576.6
249.92	20.6	21.29	46.978	-153.2	2.999	-692.2	163.4	23.09	43.305	10.3	10.93	-574.5
258.63	20.8	21.24	47.092	-133.9	3.020	-690.4	165.0	23.03	43.430	31.1	10.95	-572.3
267.41	21.0	21.18	47.206	-114.6	3.041	-688.6	166.7	22.96	43.553	52.0	10.98	-570.1
276.26	21.2	21.13	47.319	-95.2	3.063	-686.8	168.3	22.90	43.675	73.1	11.00	-567.8
285.19	21.4	21.08	47.432	-75.6	3.084	-684.9	169.9	22.83	43.796	94.3	11.03	-565.5
294.18	21.6	21.03	47.544	-56.0	3.106	-682.9	171.6	22.77	43.916	115.6	11.05	-563.1
303.23	21.8	20.98	47.656	-36.2	3.128	-681.0	173.3	22.71	44.036	137.1	11.08	-560.7
312.36	22.0	20.93	47.768	-16.3	3.150	-678.9	175.0	22.65	44.154	158.6	11.10	-558.2
321.56	22.2	20.89	47.879	3.6	3.173	-676.9	176.7	22.59	44.272	180.3	11.13	-555.7
330.82	22.4	20.84	47.990	23.7	3.195	-674.8	178.4	22.53	44.389	202.1	11.16	-553.1
340.15	22.6	20.79	48.101	43.9	3.218	-672.6	180.1	22.47	44.505	224.0	11.19	-550.4

Note: atm x 0.101325 = MPa.

Table 14. Parahydrogen Properties in the Compressed Solid States.

Temperature	Ahlers' 22.56 cm^3/mol isochore				Ahlers' 19.83 cm^3/mol isochore			Ahlers' 18.73 cm^3/mol isochore		
K	est. pressure	C_v	est. C_p	est. enthalpy	est. pressure	$C_p = C_v$	est. enthalpy	est. pressure	$C_p = C_v$	est. enthalpy
	atm	mJ/mol-K	mJ/mol-K	J/mol	atm	mJ/mol-K	J/mol	atm	mJ/mol-K	J/mol
0	5.3	0	0	-758.0	427	0	-636.0	710	0	-476.0
1	5.3	0.93	0.93	-758.0	427	0.40	-636.0	710	0.29	-476.0
2	5.3	7.58	7.58	-757.9	427	3.26	-636.0	710	2.31	-476.0
3	5.3	26.4	26.4	-757.9	427	11.18	-636.0	710	7.88	-476.0
4	5.3	65.3	65.3	-757.9	427	27.1	-636.0	710	18.94	-476.0
5	5.3	134.6	134.6	-757.8	427	54.2	-635.9	710	37.5	-476.0
6	5.3	247	247	-757.6	427	96.8	-635.9	710	66.3	-475.9
7	6.5	418	455	-757.3	427	159.1	-635.7	710	107.7	-475.8
8	8.5	662	743	-756.7	427	247	-635.5	710	164.9	-475.7
9	12	990	1209	-755.8	427	367	-635.2	710	242	-475.5
10	16	1413	1818	-754.3	427	523	-634.8	710	343	-475.2
11	22	1919	2589	-752.1	427	723	-634.2	710	471	-474.8
12	28	2499	3504	-748.9	427	968	-633.3	710	632	-474.2
13	37	3142	5112	-744.5	427	1259	-632.2	710	830	-473.5
14	50	3866	6816	-738.5	427	1597	-630.8	710	1067	-472.9
15	63	4678	8505	-731.0	427	1978	-629.0	710	1340	-471.4

Note: atm x 0.101325 = MPa.

Table 15. Isothermal Compressibility of Solid Parahydrogen ($x_T \times 10^5$), cm^2/kg

P, kg/cm² \ T, K	14.5	13.5	12.0	10.0;8.0;6.0
0		59.8[a]	57.1[a]	53.7[a]
20		54.4 ± 1.4	52.3 ± 1.3	49.4 ± 1.6
40	53.1	49.9	48.2	45.8
60	48.8	46.2	44.7	42.8
80	45.0	42.9	41.8	40.2
100	41.8	40.2	39.3	38.0
120	39.1	37.9	37.2	36.2
140	36.7	36.0	35.4	34.8
180	33.0 ± 0.7	32.9 ± 0.7	32.5 ± 0.8	32.3 ± 1.2
200				31.2[a]

[a]Obtained by extrapolation.

With permission from Udovidchenko, B. G., et al., Journ. Low Temp. Phys., 3(4), 429, 1970 [Ref. 16].

Table 16. Experimental Values of the Latent Heat of Fusion of Hydrogen

Hydrogen modification	Author	(year)	Temperature K		ΔH fusion
n-H_2	Simon and Lange[183]	(1923)	T.P.	(13.93)	28.0 ± 0.15 cal/mol
94% p-H_2	Clusius and Hiller[182]	(1929)	T.P.	(13.95)	28.03 ± 0.4 cal/mol
99.8% p-H_2	Johnston, et al.[116]	(1950)	T.P.	(13.845)	28.08[a] ± 0.15 cal/mol
99.79% p-H_2	Ahlers[169]	(1963)	T.P.	(13.803)	28.20 ± 0.24 cal/mol
99.79% p-H_2	Dwyer, et al.[117]	(1965)	T.P.	(13.803)	27.75 cal/mol
"	"		T.P.	(13.803)	28.00 cal/mol
"	"		13.808	(0.203 atm)	27.87 cal/mol
"	"		14.653	(25.85 atm)	29.37 cal/mol
"	"	These Values at	15.535	(54.4 atm)	30.80 cal/mol
"	"	Elevated Pressures	17.813	(136.05 atm)	34.21 cal/mol
"	"		19.481	(202.38 atm)	36.95 cal/mol
"	"		19.522	(204.08 atm)	36.91 cal/mol
"	"		21.186	(275.51 atm)	40.28 cal/mol
"	"			(338.10 atm)	42.87 cal/mol

[a] Average values for more than one run.

Note: atm x 0.101325 = MPa; (cal/mol) x 4.1840 = J/mol.

Table 17. Lattice Parameters for Hydrogen

species	structure	Ranges of lattice parameters, nm a	c	c/a	References
p - H_2	hcp	0.375 - 0.3761	0.6105 - 0.614	0.1623 - 0.1633	146, 188, 189
	fcc	0.524 ± 0.005	---	---	155
n - H_2	hcp	0.376 - 0.378	0.6105 - 0.616	0.1623 - 0.1633	186-188, 190
	fcc	0.5312 - 0.5338	---	---	186-188

Table 18. Debye θ, Adiabatic Bulk Modulus and Elastic Constants for Hydrogen

	Debye θ, K	adiabatic bulk modulus[197]
mechanical	111, single crystal normal[197]	174 MPa (1740 bar)
	113, polycrystal para[196]	
calorimetric	124, para calorimetric[169]	(assuming V = 22.87 cm^3/mol)
	122, para calorimetric[174]	

Elastic Constants/density, cm^2/s^2 (Data from Reference 197)

	$\frac{C_{11}}{\rho}$	$\frac{C_{12}}{\rho}$	$\frac{C_{13}}{\rho}$	$\frac{C_{33}}{\rho}$	$\frac{C_{44}}{\rho}$
normal hydrogen	4.10	1.35	0.45	4.99	0.94

Table 19. Shear Strength of Hydrogen at 4 K

shear strength(kg/cm^2)	29	41.6	61.4	64.6
mean applied pressure(kg/cm^2)	1050	2010	3190	3710

Table 20. Melting Pressures of Normal Hydrogen

Temperature K	Pressure MPa	Pressure atm
13.947	0.0072	0.071
14.	0.1662	1.64
15.	3.2880	32.45
16.	6.647	65.60
17.	10.22	100.9
18.	14.01	138.3
19.	18.01	177.7
20.	22.18	218.9
21.	26.54	261.9
22.	31.09	306.8
23.	35.80	353.3
24.	40.68	401.5
26.	50.94	502.7
30.	73.35	723.9
35.	104.8	1034.
40.	139.8	1380.
45.	178.5	1762
50.	220.7	2178

Table 21. Molar Volume[a] of Compressed Solid Parahydrogen

Pressure (atm)	Temperature (°K)				
	11.49°	13.98°	16.89°	18.20°	19.97°
0	23.08				
25	22.63	22.83			
50	22.22	22.58			
75	21.85	22.24			
100	21.53	21.93			
150		21.26	22.00		
200			21.55	21.52	
250			21.10	21.07	21.45
300				20.70	21.30
350					21.15

[a] All values of the molar volume are in cubic centimeters per mole.

With permission from Cook, G. A., et. al., Journ. Chem. Phys., 43 (4), 1313, 1965 [Ref. 211]. Note: atm x 0.101325 = MPa.

Table 22. Compressions of Normal Hydrogen at 4 K

Pressure kg/cm^2	$\frac{\Delta V'}{V_0'}$	$\frac{V}{V_0}$	M.V. cm^3/mol	$10^5 \beta_i$ cm^2/kg
P_0 or 0	---	1.000	22.65	49
200	---	.928	21.0	31
400	---	.883	20.0	23
600	---	.847	19.2	19
1,000	---	.794	18.0	14
2,043	0	.711	16.1	8.1
3,000	.065	.667	15.1	6.1
4,000	.110	.632	14.3	4.8
6,000	.181	.583	13.2	3.5
8,000	.227	.549	12.4	2.7
10,000	.266	.523	11.8	2.3
12,000	.297	.500	11.3	1.9
16,000	.343	.467	10.6	1.4
20,000	.376	.445	10.1	1.2

With permission from Stewart, J. W., Phys. Chem. Solids, 1, 146, 1956 [Ref. 180].

Table 23. Volume Changes of Hydrogen on Fusion at Elevated Temperatures

T	Bartholome[210] $n-H_2$	Roder[142] $p-H_2$	% Difference
13.96 K	2.83 cm^3/mol	2.81 cm^3/mol	.58
16.43	2.31	2.26	2.15
18.24	2.03	2.02	.61

Table 24. Sound Velocity in Solid Hydrogen

T, K	V	v_ℓ	v_t	$\beta_s \times 10^{10}$	"adiabatic"	$\beta_T \times 10^{10}$	isothermal
	cm^3/mol	m/s	m/s	cm^2/dyn	Poisson's ratio	cm^2/dyn	Poisson's ratio
			n-hydrogen				
4.2	22.64	2190	1160	3.8	0.30	4.4	
11.49	23.08	2110	1080	3.9	0.32	4.6	
13.96	23.24	2060	1030	4.1	0.33	5.1	
			p-hydrogen				
	g/cm^3						
0	0.0892	2110[a]	1140[a]	4.12	0.29	4.1	0.29
1	0.0892	2110[a]	1140[a]	4.12	0.29	4.6	0.29
2	0.0892	2110	1140	4.12	0.29	4.7	0.29
3	0.0891	2105	1140	4.15	0.29	4.8	0.26
4	0.0890	2100	1140	4.19	0.29	4.9	0.26
5	0.0889	2095	1140	4.22	0.29	5.2	0.25
6	0.0888	2090	1135	4.24	0.29	5.3	0.25
7	0.0887	2085	1130	4.26	0.29	5.3	0.25
8	0.0885	2075	1125	4.31	0.29	5.4	0.25
9	0.0883	2065	1120	4.36	0.29	5.4	0.25
10	0.0880	2050	1115	4.46	0.29	5.4	0.25
11	0.0877	2035	1105	4.53	0.29	5.4	0.25
12	0.0874	2010	1095	4.64	0.29	5.6	0.25

[a] extrapolated

Note: (cm^2/dyne) x 10^5 = cm^2/N.

Table 25. Thermal Diffusivity of Solid Hydrogen

Parahydrogen					Normal Hydrogen				
Temperature K	Density mol/L	Heat Capacity J/mol-K	Thermal Conductivity W/cm-K	Thermal Diffusivity cm^2/s	Temperature K	Density mol/L	Heat Capacity J/mol-K	Thermal Conductivity W/cm-K	Thermal Diffusivity cm^2/s
4.	43.98	.080	1.4	397.8	4.	43.98	2.100	.0100	.108
5.	43.96	.169	.54	72.6	5.	43.96	1.995	.0178	.202
6.	43.91	.319	.17	12.1	6.	43.91	1.894	.0240	.288
7.	43.84	.550	.083	3.44	7.	43.84	1.897	.0235	.282
8.	43.76	.881	.045	1.16	8.	43.76	2.071	.0202	.222
9.	43.66	1.330	.0278	.478	9.	43.66	2.351	.0164	.159
10.	43.54	1.914	.0191	.229	10.	43.54	2.717	.0131	.110
11.	43.40	2.649	.0134	.116	11.	43.40	3.156	.0107	.0781
12.	43.24	3.550	.0099	.0645	12.	43.24	3.905	.0086	.0509
13.	43.06	4.631	.0074	.0371	13.	43.06	4.857	.0071	.0339

Table 26. Thermal Expansion of Solid Parahydrogen

Temperature K	Thermal expansion coefficient, $\alpha \times 10^4$, 1/K	Temperature K	Thermal expansion coefficient, $\alpha \times 10^4$, 1/K
1	0.022	8	21.7
2	0.22	9	26.7
3	1.0	10	30.4
4	3.0	11	34.6
5	6.5	12	39.4
6	11.3	13	44.7
7	16.5	13.80	49.4

Table 27. Experimental Vapor Pressures of Normal Hydrogen Below the Triple Point

	solid		
T (K)	P(Pa)	P (mm Hg)	
3.4	1.33×10^{-7}	1.0×10^{-9}	Reference 208
3.6	7.33×10^{-7}	5.5×10^{-9}	
3.8	3.87×10^{-6}	2.9×10^{-8}	
4.0	12.67×10^{-6}	9.5×10^{-8}	
4.2	4.67×10^{-5}	3.5×10^{-7}	
4.5	2.40×10^{-4}	1.8×10^{-6}	
4.71	6.03×10^{-4}	4.52×10^{-6}	Reference 209
4.78	7.64×10^{-4}	5.73×10^{-6}	
4.85	9.71×10^{-4}	7.28×10^{-6}	
4.92	1.36×10^{-3}	1.02×10^{-5}	
5.01	1.83×10^{-3}	1.37×10^{-5}	
5.0	2.52×10^{-3}	1.89×10^{-5}	
7.43	5.36	4.02×10^{-2}	
7.74	8.96	6.72×10^{-2}	
8.11	17.2	1.29×10^{-1}	
8.76	42.4	3.18×10^{-1}	
9.29	97.6	7.32×10^{-1}	
9.91	206.6	1.55	
10.67	482.6	3.62	
11.11	759.9	5.70	

Table 28. Selected Thermophysical, Chemical and Combustion Properties of Hydrogen, Methane, and Gasoline

Property	Hydrogen	Methane	Gasoline
Molecular weight	2.016[226]	16.043[229]	~ 107.0[231]
Triple point pressure, atm	0.0695[226]	0.1159[229]	---
Triple point temperature, K	13.803[226]	90.680[229]	180 to 220[231,a]
Normal boiling point (NBP) temperature, K	20.268[226]	111.632[226]	310 to 478[231,232]
Critical pressure, atm	12.759[226]	45.387[229]	24.5 to 27[231]
Critical temperature, K	32.976[226]	190.56[229]	540 to 569[231]
Density at critical point, g/cm^3	0.0314[226]	0.1604[229]	0.23[233]
Density of liquid at triple point, g/cm^3	0.0770[226]	0.4516[229]	---
Density of solid at triple point, g/cm^3	0.0865[226]	0.4872[226]	---
Density of vapor at triple point, g/m^3	125.597[226]	251.53[229]	---
Density of liquid at NBP, g/cm^3	0.0708[226]	0.4226[226]	~.70[231,b]
Density of vapor at NBP, g/cm^3	0.00134[226]	0.00182[226]	~0.0045[233,b]
Density of gas at NTP, g/m^3	83.764[226]	651.19[226]	~ 4400[233]
Density ratio: NBP liquid-to-NTP gas	845[226]	649[226]	156[231,233,c]
Heat of fusion, J/g	58.23[226]	58.47[226]	161[236]
Heat of vaporization, J/g	445.59[226]	509.88[226]	309[231,233]
Heat of sublimation, J/g	507.39[226]	602.44[226]	---
Heat of combustion (low), kJ/g	119.93[227]	50.02[227]	44.5[227,228,233]
Heat of combustion (high), kJ/g	141.86[227]	55.53[227]	48[227,228,233]
Specific heat (C_p) of NTP gas, J/g-K	14.89[226]	2.22[226]	1.62[233,b]
Specific heat (C_p) of NBP liquid, J/g-K	9.69[226]	3.50[226]	2.20[233,b]
Specific heat ratio (C_p/C_v) of NTP gas	1.383[226]	1.308[226]	1.05[231,b]
Specific heat ratio (C_p/C_v) of NBP liquid	1.688[226]	1.676[226]	---
Viscosity of NTP gas, g/cm-s	0.0000881[226]	0.000110[226]	0.000052[233]
Viscosity of NBP liquid, g/cm-s	0.000132[226]	0.001130[226]	0.002[233]
Thermal conductivity of NTP gas, mW/cm-K	1.914[226]	0.330[226]	0.112[233]
Thermal conductivity of NBP liquid, mW/cm-K	0.99[226]	1.86[226]	1.31[233]
Surface tension of NBP liquid, N/m	0.00193[226]	0.01294[226]	0.0122[233]
Dielectric constant of NTP gas	1.00026[7]	1.00079[226]	1.0035[234,e]
Dielectric constant of NBP liquid	1.233[7]	1.6227[226]	1.93[233,d]
Index of refraction of NTP gas	1.00012[226]	1.0004[226]	1.0017[234,e]
Index of refraction of NBP liquid	1.110	1.2739[226]	1.39[233,d]
Adiabatic sound velocity in NTP gas, m/s	1294[226]	448[226]	154
Adiabatic sound velocity in NBP liquid, m/s	1093[226]	1331[226]	1155[236,f]
Compressibility factor (Z) in NTP gas	1.0006[226]	1.0243[226]	1.0069
Compressibility factor (Z) in NBP liquid	0.01712[226]	0.004145[226]	0.00643[b]
Gas constant (R), cm^3-atm/g-K	40.7037[226]	5.11477[226]	0.77
Isothermal bulk modulus (α) of NBP liquid, MN/m^2	50.13[7]	456.16[230]	763[235,f]
Volume expansivity (β) of NBP liquid, K^{-1}	0.01658[7]	0.00346[230]	0.0012[233,b]

Table 28. Selected Thermophysical, Chemical and Combustion Properties of Hydrogen, Methane, and Gasoline (cont'd.)

Property	Hydrogen	Methane	Gasoline
Limits of flammability in air, vol. %	4.0 to 75.0[237,238]	5.3 to 15.0[237,238]	1.0 to 7.6[232,242]
Limits of detonability in air, vol. %	18.3 to 59.0[239]	6.3 to 13.5[243]	1.1 to 3.3[244]
Stoichiometric composition in air, vol. %	29.53	9.48	1.76
Minimum energy for ignition in air, mJ	0.02[240]	0.29[240]	0.24[240,245]
Autoignition temperature, K	858[241]	813[232]	501 to 744[232,242]
Hot air-jet ignition temperature, K	943[246]	1493[246]	1313[246] g
Flame temperature in air, K	2318[247]	2148[247]	2470[248]
Percentage of thermal energy radiated from flame to surroundings, %	17 to 25[249,250]	23 to 33[249,250]	30 to 42[249,250]
Burning velocity in NTP air, cm/s	265 to 325[251,252]	37 to 45[242,243]	37 to 43[242,248]
Detonation velocity in NTP air, km/s	1.48 to 2.15[253,259]	1.39 to 1.64[243]	1.4 to 1.7[254] h
Diffusion coefficient in NTP air, cm^2/s	0.61	0.16	0.05
Diffusion velocity in NTP air, cm/s	$\lesssim$2.00	$\lesssim$0.51	$\lesssim$0.17
Buoyant velocity in NTP air, m/s	1.2 to 9	0.8 to 6	nonbuoyant
Maximum experimental safe gap in NTP air, cm	0.008[255]	0.12[256]	0.07[255]
Quenching gap in NTP air, cm	0.064[240,257]	0.203[240,257]	0.2[257]
Detonation induction distance in NTP air	L/D≈100[259,260]	---	---
Limiting oxygen index, vol. %	5.0[258]	12.1[258]	11.6[258] i
Vaporization rates (steady state) of liquid pools without burning, cm/min	2.5 to 5.0[250]	0.05 to 0.5[250]	0.005 to 0.02
Burning rates of spilled liquid pools, cm/min	3.0 to 6.6[249,250]	0.3 to 1.2[249,250]	0.2 to 0.9[249,250]
Flash point, K	gaseous	gaseous	~230[232]
Energy[j] of explosion, (g TNT)/(g fuel)	~24	~11	~10
Energy[j] of explosion, (g TNT)/(cm^3 NBP liquid fuel)	1.71	4.56	7.04
Energy[j] of explosion, (kg TNT)/(m^3 NTP gaseous fuel)	2.02	7.03	44.22
Toxicity	nontoxic[261] (asphyxiant)	nontoxic[262] (asphyxiant)	slight[263] (asphyxiant)

NBP = Normal boiling point.

NTP = 1 atm and 20 C (293.15 K).

TNT = Symmetrical Trinitrotoluene.

Note: Thermophysical properties listed are those of parahydrogen. Gasoline property values are the arithmetic average of normal heptane and octane in those cases where "gasoline" values could not be found (unless otherwise noted). Also atm x 0.101325 = MPa.

a Freezing temperatures for gasoline @ 1 atm.

b @ 1 atm and 15.5 C.

c Density ratio @ 1 atm and 15.5 C.

d @ 1 atm and 20 C.

e @ 1 atm and 100 C.

f @ 1 atm and 25 C.

g Based on the properties of butane.

h Based on the properties of n-pentane and benzene.

i Average value for a mixture of methane, ethane, propane, benzene, butane and higher hydrocarbons.

j Theoretical explosive yields.

Table 29
ORTHO-PARA
CONCENTRATIONS AT
EQUILIBRIUM

Temperature, K	Percentage in para form for H_2
10	99.9999
20	99.821
20.39	99.789
23.57	–
30	97.021
33.10	95.034
40	88.727
50	77.054
60	65.569
70	55.991
80	48.537
90	42.882
100	38.620
120	32.959
150	28.603
200	25.974
250	25.264
298.16	25.075
300	25.072
350	25.019
400	25.005
500	25.000

Table 30
HEATS OF CONVERSION FROM
NORMAL TO PARAHYDROGEN

Temperature, K	J/g	cal/mol
10	527.139	253.9865
20	527.140	253.987
20.39	527.138	253.986
30	527.138	253.986
33.1	527.138	253.986
40	527.117	253.976
50	526.845	253.845
60	525.531	253.212
70	521.770	251.400
80	513.932	247.623
90	500.757	241.275
100	481.671	232.079
120	427.248	205.857
150	322.495	155.385
200	163.774	78.91
250	70.524	33.98
298.16	28.558	13.76
300	27.562	13.28

CHAPTER SEVEN

PHYSICAL CONSTANTS, UNIT CONVERSIONS, AND SYMBOLS

Jesse Hord

7.1. PHYSICAL CONSTANTS

Molecular weight = 2.01594

Universal gas constant (R_o) = 8.31434 $J \cdot mol^{-1} \cdot K^{-1}$

= 8.31434 x 10^6 $N \cdot cm^3 \cdot m^{-2} \cdot mol^{-1} \cdot K^{-1}$

= 82.0562 $atm \cdot cm^3 \cdot mol^{-1} \cdot K^{-1}$

= 10.7314 psi. $ft^3 \cdot mol^{-1} \cdot °R^{-1}$

slug = 32.174 lb

7.2. UNIT CONVERSIONS

The international system of units is described in detail in NBS Special Publication 330[515] and lists of physical constants and conversions factors are tabulated by Mechtly.[516] The American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), and Institute of Electrical and Electronics Engineers (IEEE) have published a joint standard for metric practice.[517] The most recent guidelines for use of the metric system are given in References 515, 517 and 518. Selected unit conversions are given in the following tables.

UNIT CONVERSION FACTORS

Density

kg/m^3	g/cm^3	mol/cm^3	Amagat	lb/ft^3
16.018	0.016018	7.9458 x 10^{-3}	178.216	1
1	0.001	4.9605 x 10^{-4}	11.126	0.062428
1,000	1	0.49605	1.1126 x 10^4	62.428
2,015.9	2.0159	1	2.2428 x 10^4	125.85
0.089881	8.9881 x 10^{-5}	4.4586 x 10^{-5}	1	5.6111 x 10^{-3}

Specific Volume

m^3/kg (L/g)	cm^3/g	cm^3/mol	ft^3/lb
0.062428	62.428	125.85	1
1	1,000	2,015.9	16.018
0.001	1	2.0159	0.016018
4.9605×10^{-4}	0.49605	1	7.9458×10^{-3}

Pressure

MPa	atm	Torr (mm Hg)	bar	$lb_f/in.^2$ (psi)
6.8948×10^{-3}	0.068046	51.715	6.8948×10^{-2}	1
1	9.8692	7,500.6	10.0	145.04
0.101325	1	760.0	1.01325	14.696
1.3332×10^{-4}	1.3158×10^{-3}	1	1.332×10^{-3}	0.019337
0.1	0.98692	750.06	1	14.504

Enthalpy, Heat of Vaporization, Heat of Conversion, Specific Energies

kJ/kg (J/g)	J/mol	cal/g	Btu/lb
2.3244	4.6858	0.55556	1
1	2.0159	0.23901	0.43022
0.49605	1	0.11856	0.21341
4.1840	8.4345	1	1.8

Specific Heat, Entropy

kJ/kg-K (J/g-K)	J/mol-K	cal/mol-K	Btu/lb-°R
4.184	8.4345	2.0159	1
1	2.0159	0.48182	0.23901
0.49605	1	0.23901	0.11856
2.0755	4.184	1	0.49605

Thermal Conductivity

mW/cm-K	J/s-cm-K	cal/s-cm-K	Btu/ft-hr-°R
17.296	0.017296	0.0041338	1
1	0.001	2.3901×10^{-4}	0.057816
1,000	1	0.23901	57.816
4,184	4.184	1	241.90

Viscosity

kg/m-s ($N-s/m^2$)	Centipoise (10^{-2} g/cm-s)	$lb-s/ft^2$ (slug/ft-s)	lb/ft-s
1.48816	1,488.16	0.31081	1
1	1,000	0.020885	0.67197
0.001	1	2.0885×10^{-5}	6.7197×10^{-4}
47.881	4.7881×10^{4}	1	32.175

Velocity of Sound

m/s	ft/s
0.3048	1
1	3.2808

Surface Tension

N/m	dyne/cm	$lb_f/in.$
175.13	175.13×10^{3}	1
1	1,000	5.7102×10^{-3}
0.001	1	5.7102×10^{-3}

Temperature

$$T(\text{Rankine}) = 1.8T(\text{Kelvin})$$

$$T(\text{Celsius}) = T(\text{Kelvin}) - 273.15$$

$$T(\text{Fahrenheit}) = T(\text{Rankine}) - 459.67$$

$$T(\text{Fahrenheit}) = 1.8T(\text{Celsius}) + 32$$

7.3. SYMBOLS

Some of the symbols used in this compilation describe more than one property because: (1) data and accompanying symbols are gleaned from the literature and the nomenclature selected by the originating author(s) is retained and (2) the number of properties compiled far exceeds the number of available symbols. Multiple use of symbols should not result in any confusion as they are explained in the text, on the figure or table wherein they are used in context with the particular property under consideration.

7.3.1. LIST OF SYMBOLS

atm	atmosphere (pressure)
a	lattice parameter
a	accommodation coefficient
b_1, b_2, b_3, etc.	coefficients in equations
c	lattice parameter
cal	calorie
c_i	concentration of species "i" in mixture
cm	centimeter
cP	centipoise

d_A	density in amagats
dt	derivative with respect to time
ft	foot
g	gravitational acceleration constant
g	gram
h	hour
i	used as subscript to denote "ith" element or species
j	used as subscript to denote "jth" element or species
k	thermal conductivity
k	infrared absorption coefficient
kg	kilogram
ℓ	liter
l	liter
lb	pound mass
lb_f	pound force
m	meter
n	exponent in equations
n	index of refraction, also n_λ and n_∞... at infinite wavelength
p	used as subscript to denote constant pressure
p_o	vapor pressure
s	second
t	time
v	specific volume
v_ℓ	longitudinal velocity of sound in the solid
v_t	transverse velocity of sound in the solid
x	quality
x	fraction of ortho hydrogen in ortho-para mixture
x_T	isothermal compressibility

A,B,C	coefficients in equations
$\tilde{A}$	infrared absorption parameter
B	second virial coefficient
Btu	British thermal unit
C	third virial coefficient
C	temperature in degrees Celsius
$C_{11}, C_{12}, C_{13}, C_{33}, C_{44}$	elastic constants
C_i	concentration gradient of the "i" species
C_p	specific heat at constant pressure
C_p°	molar specific heat at constant pressure
C_v	specific heat at constant volume
C_σ	specific heat at saturation
D_{ij}	diffusion coefficient
D_{ij}^T	thermal diffusion coefficient
E	Young's modulus
E	internal energy
E°	molar internal energy
F	temperature in degrees Fahrenheit
F	Helmholtz free energy
F°	molar free energy
FCC	also fcc, face centered cubic
G	shear modulus
G	Gibbs free energy
H	enthalpy
H°	molar enthalpy
HCP	also hcp, hexagonal close packed
I	intensity of radiation

J	joules = watt · second
J_i	mass flux of the "ith" species
K	absolute temperature in kelvin
L	liter
LFL	lower flammable limit
LNG	liquefied natural gas
M	molecular weight
MESG	maximum experimental safe gap
MPa	megaPascal (pressure)
N	Newton
NBP	normal boiling point
NBT	normal boiling temperature (same as NBP)
NTP	normal temperature and pressure (20°C and 1 atm)
N_{Pr}	Prandtl number
P	pressure
P	molar polarizability
Pa	Pascal (pressure)
Pr	Prandtl number
P_t	triple point pressure
Q	quality
Q	heat
R	absolute temperature in degrees Rankine
R	gas constant
R_o	universal gas constant
RI	refractive index
RTP	room temperature and pressure (300 K and 1 atm)
S	entropy
S°	molar entropy
STP	standard temperature and pressure (0°C and 1 atm)

T	temperature
T_c	critical point temperature
T_t	triple point temperature
TNT	symmetrical trinitrotoluene
Torr	millimeter of mercury (pressure)
TP	triple point
U	internal energy
UFL	upper flammable limit
V	volume
W	watt
W	velocity of sound
X	mole percent solubility in solvent
Z	compressibility factor ($\equiv PV/RT$)

Greek

α	parameter in equation
α	thermal diffusivity
α	isothermal bulk modulus
α	thermal expansion coefficient
β	volume expansivity
β_i	"instantaneous" compressibility ($\approx$isothermal)
β_s	adiabatic compressibility
β_T	isothermal compressibility
γ	specific heat ratio ($\equiv C_p/C_v$)
γ	surface tension
ε	dielectric constant
ε	relative elongation

η	viscosity
θ	Debye temperature
θ	specific heat input parameter
λ	thermal conductivity
λ	wavelength
μ	viscosity
μ	Joule-Thomson coefficient
ν	frequency
ρ	density
ρ_c	density at critical point
σ_t	tensile strength (stress)
σ_y	nominal yield strength (stress)
Φ	energy derivative parameter
ω	velocity of sound

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11. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here)

The National Bureau of Standards has been engaged in the compilation, review, analytical and experimental derivation, and publication of hydrogen properties for over 20 years. The properties data presented herein are compiled largely from those accumulated data; of course, pertinent data and work of other researchers in the field are also included.

The general interests of scientists and engineers engaged in energy systems studies were given top priority in choosing the properties material presented in this book. Hydrogen systems cut across many energy related fields, e.g., nuclear fusion, magnetohydrodynamics, electrolysis and thermochemical decomposition of water, coal and shale derivative fuels, solar and wind power, ocean energy, geothermal processes, etc. It is generally conceded that hydrogen could be used to satisfy virtually all fuel requirements that are currently being met with natural gas and oil. To satisfy the demand for properties data over this broad spectrum of interests, we have attempted to provide comprehensive coverage of physical properties over a wide range of pressures and temperatures.

Thermophysical properties of liquid, liquid-vapor, vaporous, and gaseous hydrogen are presented in Chapter 1 and the solid-liquid, solid-vapor, and solid phase properties are compiled in Chapter 2. Ortho-para modifications of the hydrogen molecule and attendant property variations are considered in both chapters. Combustion and safety data, pertinent to hazard analysis of hydrogen systems, is collected in Chapter 3. Important miscellaneous properties are compiled in Chapter 4, data figures are compiled in Chapter 5, data tables are collected in Chapter 6, and Chapter 7 summarizes symbols, units, and conversion factors used throughout the book.

12. KEY WORDS (Six to twelve entries; alphabetical order; capitalize only proper names; and separate key words by semicolons)
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